SDM-300L

Satellite Modem
Operator's Guide

Part Number MN/SDM300L.OG Revision 2

SDM-300L

Satellite Modem
Operator's Guide

Comtech EFData is an ISO 9001
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Part Number MN/SDM300L.OG
Revision 2
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About this Manual

This manual provides installation and operation information for the Comtech EFData SDM-300L satellite modem. This is a technical document intended for earth station engineers, technicians, and operators responsible for the operation and maintenance of the SDM-300L.

Related Documents

The following documents are referenced in this manual:

- *Comtech EFData SDR-54 Satellite Demodulator Installation and Operation Manual*
- *Comtech EFData SDM-300L Satellite Modem Technical Information Guide*

  Note: The Technical Information Guide is available in electronic format on the Product Information CD included with the unit.
- *Comtech EFData UB-530 Universal Breakout Panel Installation and Operation Manual*
- *Comtech EFData UB-54 Universal Breakout Panel Installation and Operation Manual*
- *Comtech EFData Space Link Remote System User's Guide*

Conventions and References

Cautions and Warnings

CAUTION indicates a hazardous situation that, if not avoided, may result in minor or moderate injury. CAUTION may also be used to indicate other unsafe practices or risks of property damage.

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

Metric Conversion

Metric conversion information is located on the inside back cover of this manual. This information is provided to assist the operator in cross-referencing English to Metric conversions.

Recommended Standard Designations

Recommended Standard (RS) Designations have been superseded by the new designation of the Electronic Industries Association (EIA). References to the old designations are shown only when depicting actual text displayed on the screen of the unit (RS-232, RS-485, etc.). All other references in the manual will be shown with the EIA designations (EIA-232, EIA-485, etc.) only.

Trademarks

Windows is a trademark of the Microsoft Corporation.

Other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

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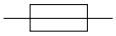
Comments and suggestions regarding the content and design of this manual will be appreciated. To submit comments, please contact the Comtech EFData Customer Support Department.

European Low Voltage Directive

The following information is applicable for the European Low Voltage Directive (EN60950):

<HAR>	Type of power cord required for use in the European Community.
	CAUTION: Double-pole/Neutral Fusing ACHTUNG: Zweipolige bzw. Neutralleiter-Sicherung

International Symbols:

	Alternating Current.
	Fuse.
	Safety Ground.
	Chassis Ground.

Note: For additional symbols, refer to “Cautions and Warnings” listed earlier in this preface.

Warranty Policy

This Comtech EFData product is warranted against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Comtech EFData will, at its option, repair or replace products that prove to be defective.

For equipment under warranty, the customer is responsible for freight to Comtech EFData and all related custom, taxes, tariffs, insurance, etc. Comtech EFData is responsible for the freight charges **only** for return of the equipment from the factory to the customer. Comtech EFData will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EFData.

Limitations of Warranty

The foregoing warranty shall not apply to defects resulting from improper installation or maintenance, abuse, unauthorized modification, or operation outside of environmental specifications for the product, or, for damages that occur due to improper repackaging of equipment for return to Comtech EFData.

No other warranty is expressed or implied. Comtech EFData specifically disclaims the implied warranties of merchantability and fitness for particular purpose.

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The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EFData shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Disclaimer

Comtech EFData has reviewed this manual thoroughly in order that it will be an easy-to-use guide to your equipment. All statements, technical information, and recommendations in this manual and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the products described. Further, Comtech EFData reserves the right to make changes in the specifications of the products described in this manual at any time without notice and without obligation to notify any person of such changes.

If you have any questions regarding your equipment or the information in this manual, please contact the Comtech EFData Customer Support Department.

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Chapter 1. INTRODUCTION

This chapter provides an overview of the SDM-300L satellite modem, referred to in this manual as “the modem” (Figure 1-1).

Note: An SDM-300L Technical Information Guide is available in electronic format on the CD included with the unit. It contains detailed information that is beyond the scope of this Operator’s Guide.

Figure 1-1. SDM-300L

The SDM-300L Digital Satellite Modem is a high performance, full duplex modem. The unit is available in two versions as described in Table 1-1.

Table 1-1. SDM-300L Versions

Type	Transmit (TX)	Receive (RX)
SDM-300L-1	70/140 MHz	L-Band
SDM-300L-2	L-Band	L-Band

Refer to Figure 1-2 for a system block diagram.

Notes:

1. The UB-530 universal breakout panel (BOP) is an option for V.35, G703, EIA-232, and EIA-422.
2. When the modem is equipped with a 50-pin data I/O connector, the use of the BOP is required to interface the customer data connector to the modem.
3. Contact Comtech EFData for information concerning universal breakout panels.

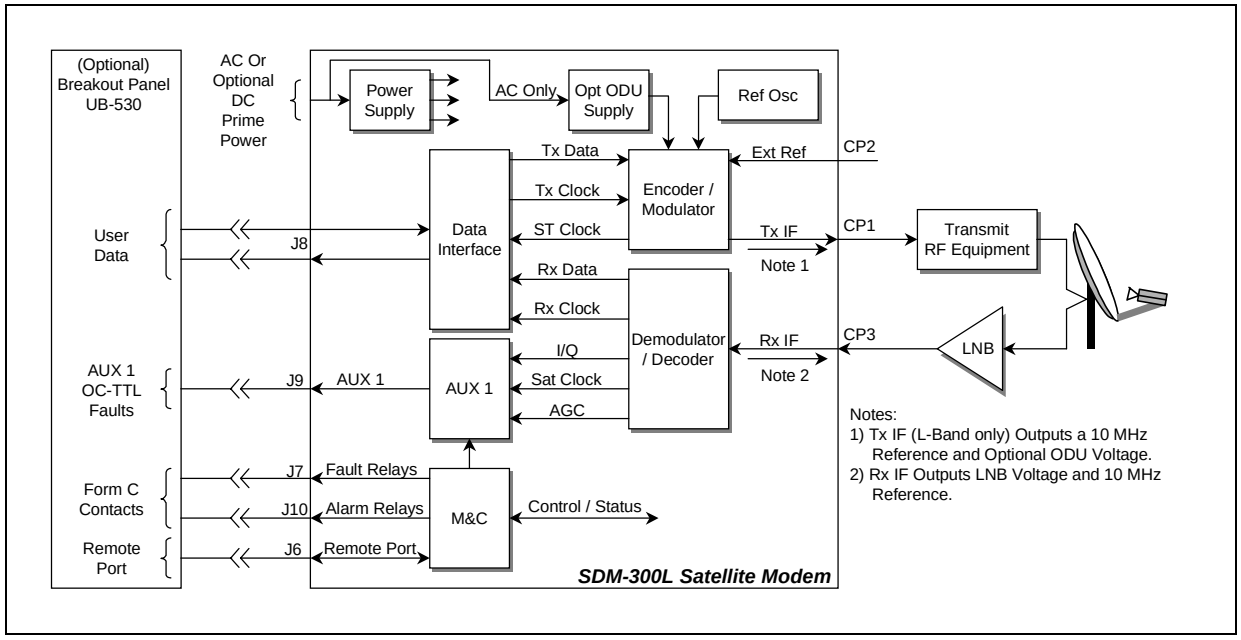

Figure 1-2. Block Diagram

1.1 Overview

The SDM-300L utilizes advanced technology and digital signal processing techniques. This design eliminates circuitry to perform modem signal processing, resulting in higher reliability. The following lists the unit's features:

- 2.4 kbit/s to 4.375 Mbit/s
- Fully Accessible System Topology (FAST)
- Closed Network Capability
- Automatic Uplink Power Control (AUPC)
- Asynchronous (ASYNC) Channel Unit Overhead
- Reed-Solomon
- FAST Acquisition
- Built-In Test (With L-Band TX and RX only)
- OQPSK

1.1.1 Available Options

FAST is Comtech EFData's exclusive feature that eliminates the need to acquire options before they are required. The following list reflects the options available via FAST implementation.

- Variable Data Rate
- Viterbi or Sequential Decoder
- OQPSK
- Asymmetrical Loop Timing
- G.703 Interface
- Concatenated Reed-Solomon Codec
- ASYNC/AUPC Overhead with 50-pin D connector

When additional features are required, they are added on site, using FAST access codes (Appendix A). For addition information, contact the Comtech EFData Customer Support department.

1.1.2 Monitoring Features

The unit's monitoring features include:

- Interface Loopback – at the MOD and DEMOD interface (Bi-directional)
- Baseband Loopback – at the data interface (Bi-directional)
- BER, E_b/N_0 , Buffer Fill Percentage
- IF Loopback (Not available with 70/140 MHz TX IF)

1.1.3 Compatibility

The SDM-300L is functionally compatible with many Comtech EFData modems. When properly configured, the unit will interoperate with the following Comtech EFData modems:

- SDM-100
- SDM-100A
- SDM-300
- SDM-300A
- SDM-650B
- SDM-6000
- SDM-8000

1.2 Application Notes

Refer to Table 1-2 for Application Notes that are applicable to the SDM-300L.

Table 1-2. Application Notes

Application Note P/N	Date	Title
APN/FAST	21 April 1999	Fully Accessible System Topology “FAST”
APN/ReedSol	21 April 1999	Reed-Solomon Concatenated Codes

1.3 Specifications

Refer to Table 1-3 for general specifications.

Table 1-3. General Specifications

Specification (Fully Enhanced)	
Digital Interface (Standard)	EIA-232, EIA-422, and V.35 (25-pin D)
Digital Data Rate	2.4 kbit/s to 4.375 Mbit/s, in 1 bit steps **Note:** In some applications the practical lower data rate is typically 19.2 kbit/s or higher., depending upon the performance of equipment used in conjunction with the SDM-300L. These applications include the use of a BUC or a LNB.
Symbol Rate	4.8 ksym/s to 2.5 Msym/s
Modulation/Demodulation	BPSK 1/2 Rate QPSK 1/2, 3/4, and 7/8 rate OQPSK 1/2, 3/4, and 7/8 rate
Plesiochronous Buffer	2 to 99 msec, in 2 msec steps to 2.6 Mbit/s 32 to 262122 bit/s in 16 bit steps
Forward Error Correction (FEC)	Viterbi, K =7, 1/2, 3/4, and 7/8 rate Sequential 1/2, 3/4, and 7/8 rate Reed-Solomon
Data Scrambling	IESS-308 (V.35) or None
External Reference Input	EXT 1, EXT 5, EXT 10, and EXT 20 MHz
External Reference Output Level (Sourcing)	10 MHz, 0 to +10 dBm

Table 1-3. General Specifications (Continued)

Modulation Specification		
Parameter	**70/140 MHz**	**L-Band Option**
Output Frequency	50 to 90 and 100 to 180 MHz in 1 Hz steps	950 to 1750 MHz in 100 Hz steps
Output Power	+5 to –20 dBm in 0.1 dB steps	0 to –30 dBm in 0.5 dB steps, with ± 2.5 dB accuracy
Output Stability	± 0.5 dB	± 0.5 dB
Output Spurious in 4 kHz Band (measured with modulated carrier)	< -50 dBc, 20 to 500 MHz > 64 kbit/s < -45 dBc, 20 to 500MHz ≤ 64 kbit/s	< –50 dBc, 55 to 2000 MHz
Output Phase Noise	< -66 dBc/Hz at 100Hz < -76 dBc/Hz at 1 kHz < -86 dBc/Hz at 10 kHz < -96 dBc/Hz at 100 kHz < -96 dBc/Hz at 1 MHz	< -63 dBc/Hz at 100 Hz < -73 dBc/Hz at 1 kHz < -83 dBc/Hz at 10 MHz < -93 dBc/Hz at 100 kHz
Output Impedance, Return Loss	75Ω ≥ 20 dB	50Ω ≥ 15 dB
Output Spectrum	IESS-308/-309, EFD Closed	IESS-308/-309, EFD Closed
Data Clock Source	Internal or External	Internal or External
Internal Stability	± 10 ppm	± 0.02 ppm
Output Connector	BNC, Female	Type N, Female
Outdoor Reference (center conductor of IF Output connector)	Not Applicable	On or Off 10 MHz ± 0.02 ppm at 0 ± 3 dBm
Outdoor Unit (ODU) DC Voltage (From IF output connector)	Not Applicable	On or Off (with optional ODU voltage)
Demodulation Specification		
Input Frequency	950 to 1750 MHz in 100 Hz steps	
Minimum Input Power (Desired Carrier)	+10 log (symbol rate) – 135 dBm	
AGC Range	50 dB above minimum input level	
Composite to Desired Carrier	+40 dBc, ≥ 64 ksym/s +50 dBc, < 64 ksym/s	
Maximum Composite Level	–5 dBm	
Input Impedance, Return Loss	75Ω ≥ 10 dB	
Input Connector	Type N, Female	
Carrier Acquisition Range	± 75 kHz in 1 Hz steps	
Acquisition Time	<1 second at 64 kbit/s 1/2 rate	
Sweep Reacquisition	0 to 999 seconds, in 1 second steps	
Buffer Clock	Internal, External, Transmit, Recovered RX	
LNB Voltage	On or Off +13 and +18 VDC per DiSEqC 4.2 and + 24VDC at 500 mA maximum	
LNB Reference (Center Conductor or IF Input Connector)	On or Off 10 MHz ± 0.02 ppm at – 6 to +0 dBm	

Table 1-3. General Specifications (Continued)

Environmental Specifications		
Prime Power	90 to 264 VAC, 47 to 63 Hz	
Dimensions	1.75 H x 19 W x 19.18 D inches (1 RU) (4.44 H x 48.26 W x 48.72 D cm)	
Weight	12 lbs (5 kg) maximum	
Operating Temperature	0 to 50°C (32 to 122°F)	
Humidity	Up to 95% non-condensing	
Remote Control Specification		
Serial Interface	**EIA-232 or**	**EIA-485 (2-/4-wire)**
Signals Controlled or Monitored	Terminal Frequency Transmit Power Data Rate Select RF Loopback (L-Band) Scrambler (On/Off) Receive Carrier Detect Power Supply Voltages Plesiochronous Buffer Field Upgradability	Receive Frequency Transmitter On/Off Data Loopbacks IF Loopback (L-Band) Raw Error Rate Receive Signal Level Fault Status Error Threshold Alarm
Configuration Retention	Will maintain current configuration for at least 1 year without power.	

Table 1-3. General Specifications (Continued)

BER and Eb/No Performance				
Sequential Decoder BPSK (1/2 Only) QPSK and OQPSK				
Data Rate: 100 kbit/s	**BER**	**1/2**	**3/4**	**7/8**
	10^{-5}	4.5 dB	5.5 dB	6.6 dB
	10^{-7}	5.4 dB	6.4 dB	7.8 dB
Data Rate: 1.544 Mbit/s	**BER**	**1/2**	**3/4**	**7/8**
	10^{-5}	5.6 dB	6.1 dB	6.9 dB
	10^{-7}	6.3 dB	7.0 dB	7.9 dB
Viterbi Decoder BPSK (1/2 Only) QPSK and OQPSK				
BER	**1/2**	**3/4**	**7/8**	
10^{-5}	5.3 dB	6.4 dB	7.6 dB	
10^{-6}	6.0 dB	7.2 dB	8.3 dB	
10^{-7}	6.6 dB	7.9 dB	8.9 dB	
10^{-8}	7.2 dB	8.5 dB	9.6 dB	
Concatenated Reed-Solomon Codes BPSK (1/2 Only) QPSK and OQPSK				
BER	**1/2**	**3/4**	**7/8**	
10^{-6}	4.1 dB	5.6 dB	6.7 dB	
10^{-7}	4.2 dB	5.8 dB	6.9 dB	
10^{-8}	4.4 dB	6.0 dB	7.1 dB	

1.4 Dimensional Envelope

Refer to Figure 1-3 for the unit's dimensional envelope drawing.

Note: Dimensions are listed in inches and centimeters are in parentheses.

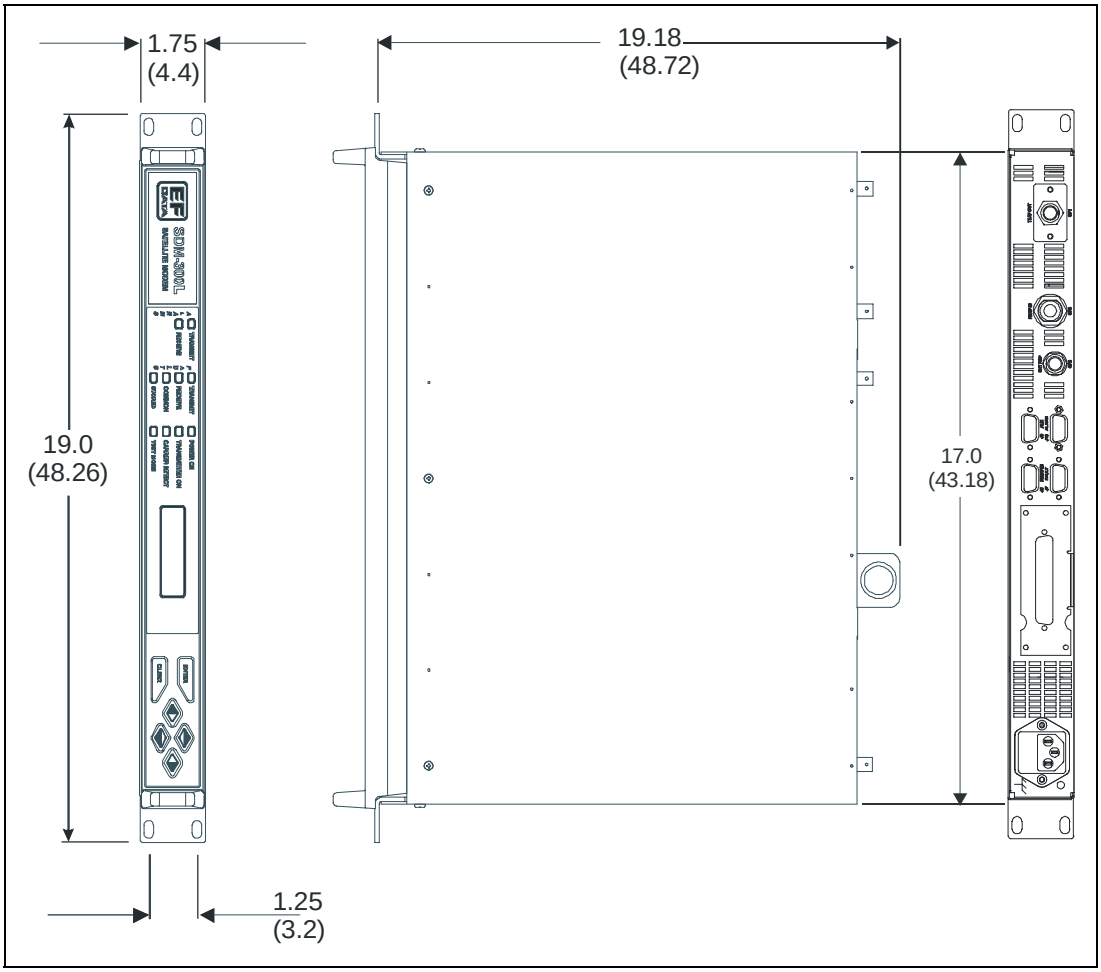

Figure 1-3. Dimensional Envelope Drawing

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2 Chapter 2. INSTALLATION

This chapter describes the installation and external connections for the SDM-300L unit.

2.1 Unpacking

The modem and manual are packaged in pre-formed, reusable, cardboard cartons containing foam spacing for maximum shipping protection.

Do not use any cutting tool that will extend more than 1 inch into the container and cause damage to the modem.

Unpack the modem:

1. Cut the tape at the top of the carton indicated by OPEN THIS END.
2. Remove the cardboard/foam space covering the modem and caddypacks.
3. Remove the modem, caddypacks, manual, and power cord from the carton.
4. Save the packing material for storage or reshipment purposes.
5. Inspect the equipment for any possible damage incurred during shipment.
6. Check the equipment against the packing list to ensure the shipment is correct.
7. Refer to Section 2.2 for installation instructions.

2.2 Installation

The modem arrives fully assembled from the factory. After unpacking the modem, install the modem as follows:

2.2.1 IDU Installation (Optional)

Refer to Figure 2-1. Use mounting kit KT/6228-1.

Optional: Mounting Kit , KT/6228-1 (IDU to Equipment Rack)

QTY	Part Number	Description
2	FP/6138-1	Bracket, Rear Support
4	HW/10-32x1/2RK	Bolt, #10 Rack
2	HW/10-32X1/4 SHC	Screw, Socket 10-32 x 1/4inch

Tools Required:

Screw Driver Phillips
5/32-inch SAE Allen Wrench

1. Install the IDU rear support brackets as follows:

   a. Install provided rear support bracket onto the mounting rail of the rack. Fasten with provided bracket bolts.

   b. Fasten the provided #10 socket head screws to the rear-side mounting holes on either side of the chassis modem. Mount the modem into the equipment rack ensuring that the socket heads engage into the slots of the rear support brackets.

      Note: It may be necessary to adjust the location of the rear mounting rails of the rack.

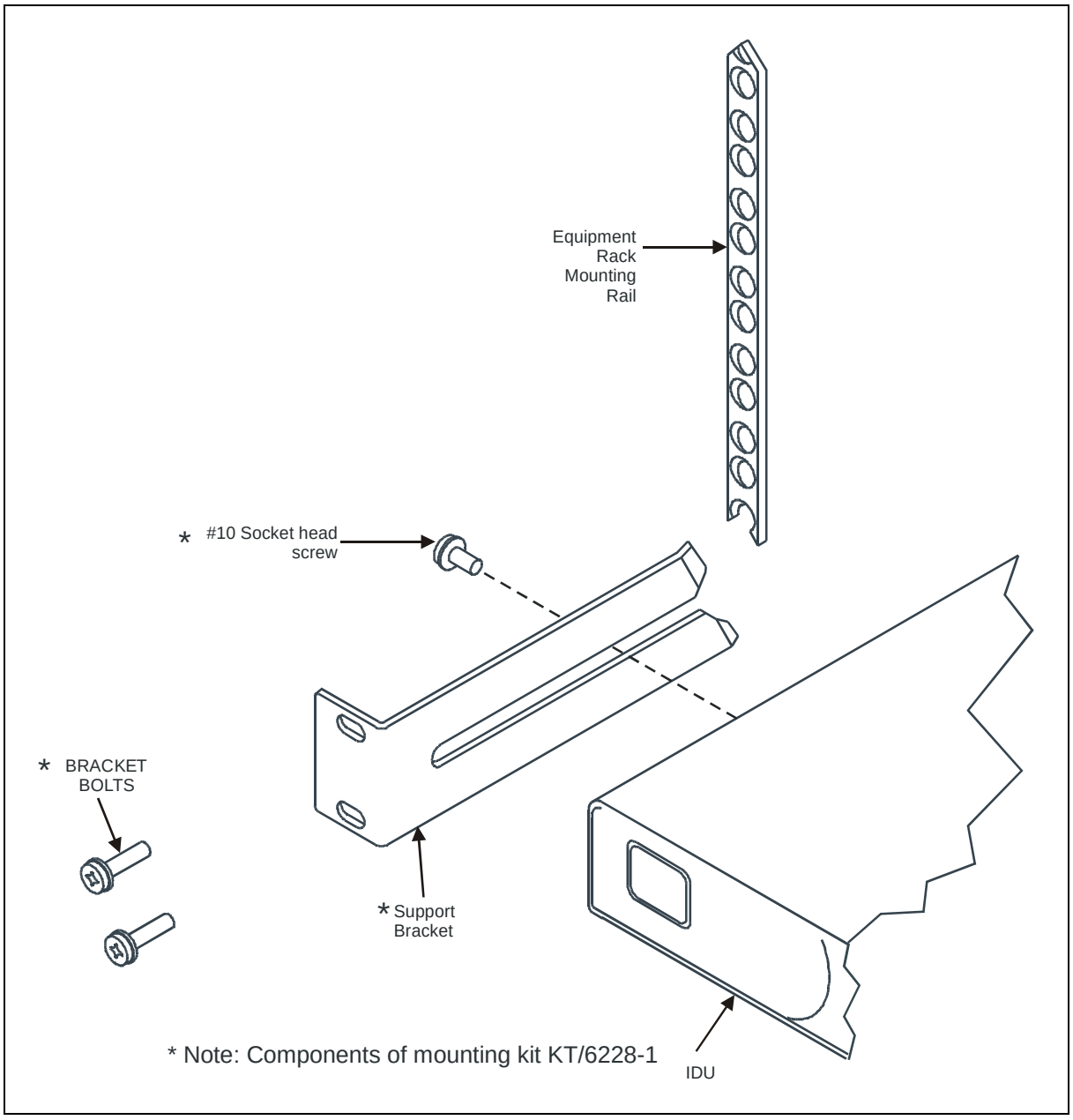


Figure 2-1. Installation of the Optional Mounting Bracket KT/6228-1

2.3 External Modem Connections

When a breakout panel, such as the UB-530, is not required, the rear panel connectors provide all necessary external connections between the modem and other equipment. Table 2-1 lists these connectors, and Figure 2-2 through Figure 2-5 show their locations.

Notes:

1. Refer to the Comtech EFData *UB-530 Universal Breakout Panel Installation and Operation Manual* for connecting the UB-300 breakout panel.
2. Refer to the Comtech EFData *UB-54 Breakout Panel Installation and Operation Manual* for connecting the UB-54 breakout panel in a MUX option configuration.

Table 2-1. Modem Rear Panel Connectors

Name	Ref. Desig.	Connector Type	Function
TX/IF OUTPUT	CP1	BNC (70/140 MHz) Type N (L-Band)	RF Output
EXT REF	CP2	BNC	EXT REF IN
RF IF INPUT	CP3	Type N 75Ω	RF Input
REMOTE	J6	9-pin D	Remote Interface
FAULT	J7	9-pin D	FORM C Fault Relay Contacts
DATA I/O	J8	25-pin D 34-pin 37-pin D 50-pin D	Data Input/Output (standard modem) V.35 EIA-449 Data Input/Output (modem with ASYNC/AUPC/IDR/IBS option)
AUX 1	J9	9-pin D	(TTL) Faults Satellite Clock Demod I/Q Automatic Gain Control (AGC) Out
ALARMS	J10	9-pin D	FORM C Alarm Relay Contacts
AC INPUT	NONE	IEC	
GROUND	NONE	10-32 Stud	

Note: The European EMC Directive (EN55022, EN50082-1) requires using properly shielded cables for DATA I/O. These cables must be double-shielded from end-to-end, ensuring a continuous ground shield.

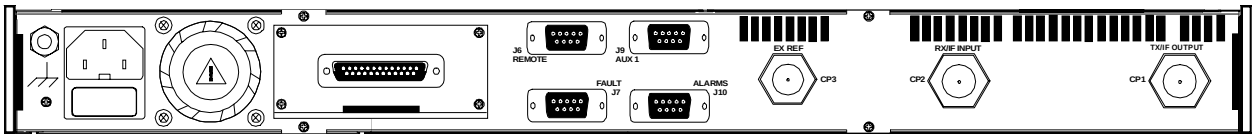


Figure 2-2. Basic Modem, 25-Pin D Connector

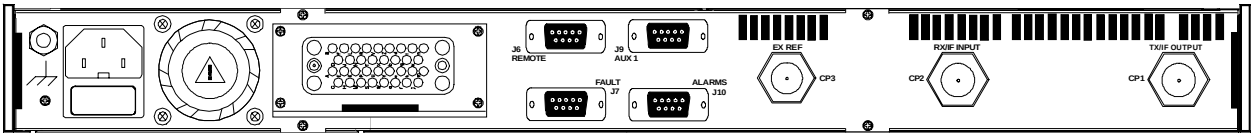


Figure 2-3. (V.35) 34-Pin Winchester Connector

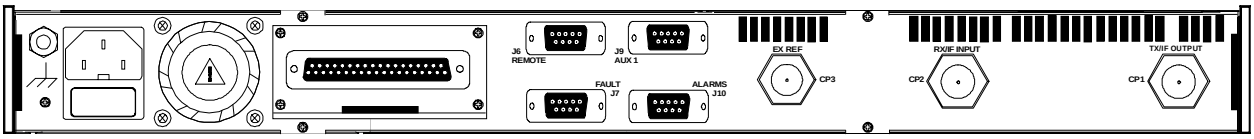


Figure 2-4. EIA-422/449, 37-Pin D Connector

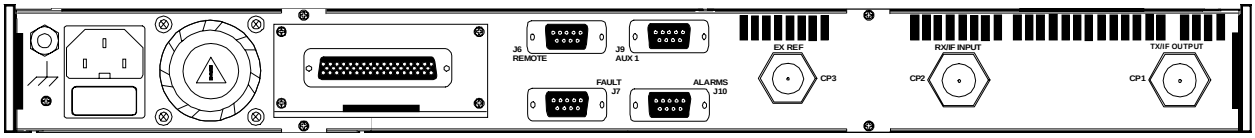


Figure 2-5. Overhead Option, 50-Pin D Connector

Remote Connector and Pinouts (J6)

The remote connector is a 9-pin subminiature female D connector (J6) located on the rear panel of the modem. Screw locks are provided for mechanical security of the mating connector.

The remote connector interfaces the M&C functions to a remote location. The remote location can be an M&C computer located away from the modem, but attached via cable to the remote connector. This DCE interface is user selectable for either EIA-232 or EIA-484.

Refer to Table 2-2 for pinout information.

Table 2-2. Remote Connector and Pinouts (J6)

Pinout				
EIA-232		EIA-485		
Pin #	Name	Pin #	Name (2-Wire)	Name (4-Wire)
1		1	GND	
2	RD (RX)	2		
3	TD (TX)	3		
4		4*	+RX/TX	+TX
5	GND	5*	-RX/TX	-TX
6	DSR	6		
7	RTS	7		
8	CTS	8*	+RX/TX	+RX
9		9*	-RX/TX	-RX

*For 2-Wire Operation:

- Only two wires are required.
- Tie pins 4 and 8 together (both +).
- Tie pins 5 and 9 together (both -).

Fault Connector and Pinouts (J7)

The fault connector provides Form C contact closures for fault reporting. The three Form C summary fault contacts, ratings 1A maximum at 24 VDC, 0.5A at 120 VAC, are Modulator, Demodulator, and Common Equipment.

The fault interface connection is a 9-pin subminiature female D connector (J7) located on the rear panel of the modem. Screw locks are provided for mechanical security on the mating connector. Refer to Table 2-3 for pinout information.

Table 2-3. Fault Connector and Pinouts (J7)

Pin #	Signal Function	Name
1	Common equipment is not faulted	NO
2		COM
3	Common equipment is faulted	NC
4	Modulator is not faulted	NO
5		COM
6	Modulator is faulted	NC
7	Demodulator is not faulted	NO
8		COM
9	Demodulator is faulted	NC

Note: A connection between the common (COM) and normally open (NO) contacts indicates no fault.

Data I/O Interface Connector (J8)

The Data I/O interface connector conducts data input and output signals to and from the modem, and connects to the customer's terrestrial equipment, breakout panel, or protection switch. The modem is currently available with a choice of four Data I/O connectors, as follows:

- 25-pin D connector is the standard connector shipped with a base platform modem.
- 50-pin D connector is the standard connector when the modem is ordered with the optional overhead PCB or if the overhead PCB has been installed in the field.
- 50-pin D that can be ordered with the basic modem, but it does not include the Overhead Card. This is used with breakout panels and switches.
- 37-pin D is an alternate connector available upon special request for the base platform modem.
- 34-pin Winchester is an alternate connector available upon special request for the base platform modem.

The Data I/O pinout is different for each of the interface configurations. For pinout information, refer to the appropriate table as follows:

Standard: 25-pin D connector	Table 2-4
Optional: 34-pin Winchester connector	Table 2-5
Optional: 37-pin D connector	Table 2-6
Optional: 50-pin D connector	Table 2-7

Table 2-4. 25-Pin D Connector Pinouts

25-Pin D Connector			
Pin #	**EIA-422**	**EIA-232**	**V.35**
1	SHLD	SHLD	SHLD
2	SD-A	TXD	SD-A
3	RD-A	RXD	RD-A
4	RS-A	RTS	RTS
5	CS-A	CTS	CTS
6	DM-A	DSR	DSR
7	SIGGND	SIGGND	SIGGND
8	RR-A	DCD	RLSD
9	RT+B		SCR+B
10	RR-B		
11	TT+B		SCTE+B
12	ST+B		SCT+B
13	CS+B		
14	SD+B		SD+B
15	ST-A	ST	SCT-A
16	RD+B		RD+B
17	RT-A	RXC	SCR-A
18	LL	LL	LL
19	RS+B		
20*	MC-A	MC	MC-A
21	DF	DF	DF
22	DM+B		
23*	MC+B		MC-B
24	TT-A	TXC	SCTE-A
25	MF	MF	MF

***Note:** Use the MASTER clock for EXTERNAL clock input. This clock input should equal the data rate unless the Asymmetrical Loop Timing Option (ASLT) is available. The ASLT option allows selection of different clock rates that vary from the digital data rate. Refer to the Utility/Modem Type/Modem Options menu for the ASLT option information.

Table 2-5. 34-Pin Winchester Connector Pinouts (V.35)

Pin #	Name
A	SIGGND
B	SHLD
C	Request to Send (RTS)
D	Clear to Send (CTS)
E	Data Set Ready (DSR)
F	Receive Line Signal Detect (RLSD)
P	Send Data A (SD-A)
R	Receive Data A (RD-A)
S	Send Data B (SD+B)
T	Receive Data B (RD+B)
U	Serial Clock Transmit External A (SCTE-A)
V	Serial Clock Receive A (SCR-A)
W	Serial Clock Transmit External B (SCTE+B)
X	Serial Clock Receive B (SCR+B)
Y	Serial Clock Transmit A (SCT-A)
c (CC)	MC-A
d (DD)	MC-B
m (MM)	Modulator Fault (MF)
n (NN)	Demodulator Fault (DF)
a(AA)	Serial Clock Transmit B (SCT+B)

Note: Pins H, J, K, L, M, N, Z, a (AA), b (BB), e (EE), f (FF), h (HH), j (JJ), k (KK), l (LL) have no connection.

The modem is available with a Winchester V.35 as the data I/O connector (PL/6032). There is a jumper on the unit that either opens or closes the CC line. The interface is shipped with jumpers in positions 2 and 3, because:

1. Comtech EFData has determined that several locations use Fireberd™ test equipment and a conflict will occur if CC is connected between the modem and the Fireberd™.

2. Placing the jumper in positions 2 and 3 opens up the CC line, because the TTC/Fireberd™ test equipment interfaces use the line for DTE/DCE control.

3. Grounding pin CC at the Fireberd™ interface will change the Fireberd ™ to a DCE device.

4. Comtech EFData uses the CC and DD for the input master clock (same as the external clock input to the modem). To input an external clock, change the jumper to positions 1 and 2 (the pin closest to the Winchester connector).

Table 2-6. 37-Pin Connector Pinouts (Optional)

Pin #	EIA-422/MIL-188-144
1, 19	Shield
3	MF
4	SD-A
5	ST-A
6	RD-A
7	RS-A
8	RT-A
9	CS-A
11	DM-A
13	RR-A
16	MC-A
17	TT-A
20, 37	SIGGND
21	DF
22	SD+B
23	ST+B
24	RD+B
25	RS+B
26	RT+B
27	CS+B
29	DM+B
31	RR+B
34	MC+B
35	TT+B

There are jumpers on the PL/6031 EIA-422 interface. Place the jumpers on the center pin and the pin towards the Master Clock (MC) to allow an external clock input on pins 16 and 34.

If desired, place the jumpers on the TR side to allow an external clock input on pins 12 and 30. Place the jumpers on the TR side for Demand Assigned Multiple Access (DAMA) applications.

Table 2-7. 50-Pin Connector Pinouts

50-Pin D Connector				
Pin #	**IDR**	**IBS**	**Async**	**D&I**
1	GND	GND	GND	GND
2	GND	GND	GND	GND
3	AGC Out	AGC Out	AGC Out	AGC Out
4	EIA-422 TXOctA In		ESC TXDB In (EIA-485 only)	
5	EIA-422 TXOctB In	ESC TXDA In (EIA-232 only)	ESC TXDA In (EIA-485 and EIA-232)	ESC TXD In (EIA-232 only)
6	EIA-422 RXOctA Out		ESC RXDB Out (EIA-485 only)	
7	EIA-422 RXOctB Out	ESC RXDA Out (EIA-232 only)	ESC RXDA Out (EIA-485 and EIA-232)	ESC RXD Out (EIA-232 only)
8	BWO1_C	EIA-422 RX Oct A		
9	BWO2_C	EIA-422 RX Oct B		
10	BWO3_C	PRIMARY_C		PRIMARY_C
11	BWO4_C	SECONDARY_C		SECONDARY_C
12	BWAI 1	V.35/EIA-422 SCTE/TT-A	V.35/EIA-422 SCTE/TT A	
13	BWAI 2	V.35/EIA-422 SCTE/TT-B	V.35/EIA-422 SCTE/TT B	
14	BWAI 3	EIA-422 TX Oct A		
15	BWAI 4	EIA-422 TX Oct B		
16	Demod Fault C			
17	Def Maint Alrm			
18	G.703 SDB In	G.703 SDB In	G.703 SDB In	G.703 SDB In
19	EIA-422 ExtClkB In	V.35/EIA-422 EXCB In	V.35/EIA-422 EXCB In	EIA-422 EXCB In
20	G.703 RDB Out	G.703 RDB Out	G.703 RDB Out	G.703 RDB Out
21	EIA-422 8k TClkA Out	V.35/EIA-422 ST-A Out	V.35/EIA-422 ST-A Out	
22	EIA-422 8k TClkB Out	V.35/EIA-422 ST-B Out	V.35/EIA-422 ST-B Out	
23	EIA-422 8k RClkA Out	V.35/EIA-422 RT-A Out	V.35/EIA-422 RT-A Out	
24	EIA-422 8k RClkB Out	V.35/EIA-422 RT-B Out	V.35/EIA-422 RT-B Out	
25	BWO1_NC	ESC TCLK Out (EIA-232)		
26	BWO2_NC	ESC RCLK Out (EIA-232)		
27	BWO3_NC	PRIMARY_NC		PRIMARY_NC
28	BWO4_NC	SECONDARY_NC		SECONDARY_NC
29	Aud1-B In (or 64SDB)	V.35/EIA-422 RTS-B	V.35/EIA-422 RTS-B	
30	Aud1-B Out (or 64RTB)	V.35 RLSD/EIA-422 RR-B	V.35 RLSD/EIA-422 RR-B	
31	Aud2-B In (or 64STB)	V.35/EIA-422 CTS-B	V.35/EIA-422 CTS-B	
32	Aud2-B Out (or 64RDB)	V.35 DSR/EIA-422 DM-B	V.35 DSR/EIA-422 DM-B	
33	DF			
34	G.703 SDA In	G.703 SDA In	G.703 SDA In	G.703 SDA In
35	EIA-422 ExtClkA In	V.35/EIA-422 EXCA In	V.35/EIA-422 EXCA In	EIA-422 EXCA In
36	G.703 RDA Out	G.703 RDA Out	G.703 RDA Out	G.703 RDA Out
37	EIA-422 8k TXDA In	V.35/EIA-422 SD-A In	V.35/EIA-422 SD-A In	G.703 DDO-A Out
38	EIA-422 8k TXDB In	V.35/EIA-422 SD-B In	V.35/EIA-422 SD-B In	G.703 DDO-B Out
39	EIA-422 8k RXDA Out	V.35/EIA-422 RD-A Out	V.35/EIA-422 RD-A Out	G.703 IDI-A In
40	EIA-422 8k RXDB Out	V.35/EIA-422 RD-B Out	V.35/EIA-422 RD-B Out	G.703 IDI-B In
41	BWO1_NO	ESC DSR (EIA-232)		
42	BWO2_NO			
43	BWO3_NO	PRIMARY_NO		PRIMARY_NO
44	BWO4_NO	SECONDARY_NO		SECONDARY_NO
45	Aud1-A In (or 64SDA)	V.35/EIA-422 RTS-A	V.35/EIA-422 RTS-A	
46	Aud1-A Out (or 64RTA)	V.35 RLSD/EIA-422 RR-A	V.35 RLSD/EIA-422 RR-A	
47	Aud2-A In (or 64STA)	V.35/EIA-422 CTS-A	V.35/EIA-422 CTS-A	
48	Aud2-A Out (or 64RDA)	V.35 DSR/EIA-422 DM-A	V.35 DSR/EIA-422 DM-A	ESC DSR (EIA-232 only)
49	MF			
50	Demod Fault NO			

Notes:

1. IDR configuration connector pinouts:
   a. Backward alarm relay contacts are named for normal no fault conditions (BWOx-C connected to BWOx-NC if no fault).
   b. Backward alarm inputs should be grounded or pulled logic low to clear the alarm.
   c. Signals MF, DF, and DMA are open-collector, high-impedance (if faulted). MF and DF are used by a backup protection switch if the modem is used in a redundant system.
   d. Relay contacts DF-C and DF-NO are named for faulted condition (DF-C connected to DF-NO, unless demodulator [Demod] fault).
2. D&I/ASYNC interface connector pinouts:
   a. With regard to alarm relay contacts, COMM is connected to NO when there is no fault. COMM is connected to NC in a faulted condition.
   b. Signals MF, DF, and DMA are open-collector, high-impedance (if faulted). MF and DF are used by a backup protection switch if the modem is used in a redundant system.
3. The breakout panel provides the external connections between the modem and the terrestrial equipment when the modem has a 50-pin connection.

2.3.1.1 Data I/O Interface Connector (J8) Removal/Installation

Note: The following procedures outline the removal and installation of the Data I/O connector (J8). These procedures are written with the assumption that the same configured connector will be reinstalled. However, the operator does have an option to install a different configured connector. Refer to Table 2-8 for a matrix explaining connector options.

Table 2-8. Connector (J8) Matrix

Modem Configuration	EIA-232	EIA-422/EIA449	V.35	Overhead
25-pin Connector	X	X	X	
34-pin Connector			X	
37-pin Connector		X		
50-pin Connector	X	X	X	X

2.3.1.1.1 Data I/O Connector (J8) Removal

1. (For Ribbon-Configured Connector PL/6031.) Remove Data I/O connector (J8) (Figure 2-6) as follows:

   a. Remove four screws securing the rear panel to the chassis.

   b. Pull out rear panel to gain access to disconnect connector (J8).

   c. Disconnect connector (J8) from the PCB.

   d. Remove the four screws securing connector (J8) to the rear panel.

   e. Remove the connector (J8).

2. Remove 50-pin Data I/O connector (J8) as follows:

   a. Remove the four screws securing the connector (J8) to the rear panel.

   b. Establish a grip on connector (J8) and pull backwards until separation of the connectors is obtained.

   c. Remove connector (J8).

2.3.1.1.2 Data I/O Connector (J8) Installation

1. (For Ribbon-Configured Connector PL/6031.) Install Data I/O connector (J8) (Figure 2-6) as follows:

   a. Position connector (J8) in rear panel.

   Use care when connecting the data I/O connector (J8) to the PCB. Damage to the connector pins may render the data I/O connector (J8) unserviceable. Misalignment can be the result.

   b. Connect connector (J8) to the PCB.

   c. Secure connector (J8) to the rear panel with four screws.

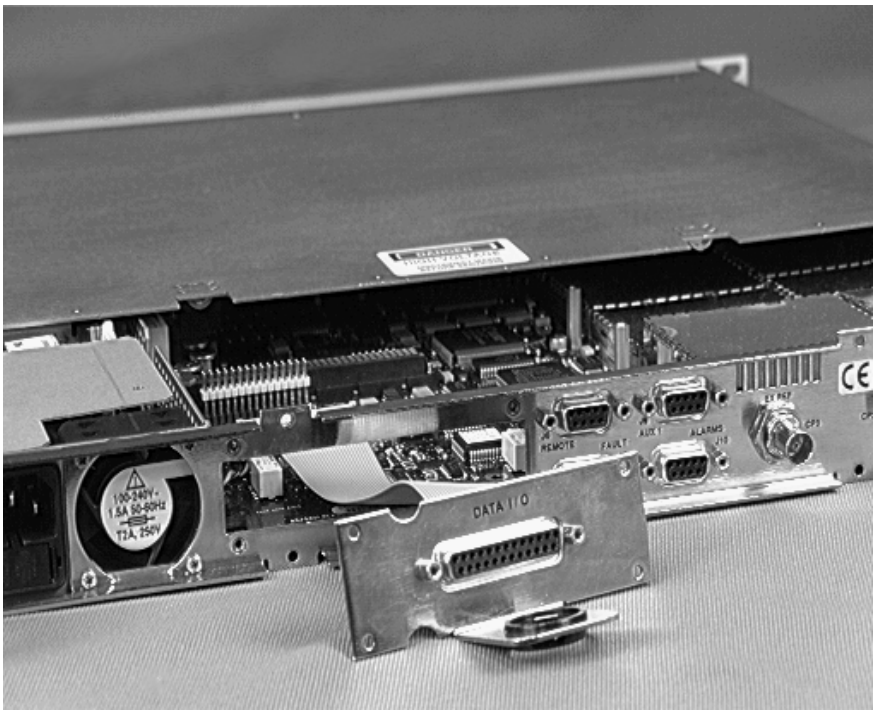
   d. Position the rear panel to mate with the chassis and secure with four screws.

2. Install 50-pin Data I/O connector (J8) as follows:

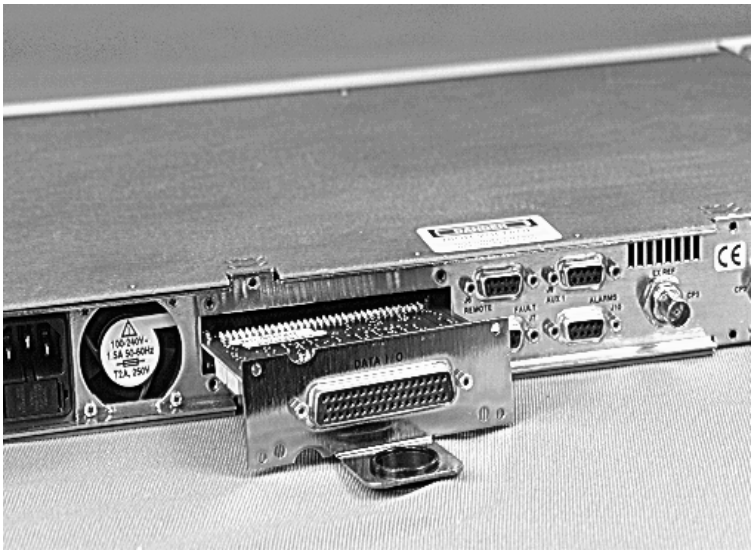
   Use care when connecting the Data I/O connector (J8) to the PCB. Damage to the connector pins may render the data I/O connector (J8) unserviceable. Misalignment can be the result.

   a. Connect connector (J8) to the PCB.

   b. Secure connector (J8) using four screws.



For Ribbon-Configured Connector



For 50-Pin Connector with Overhead Interface Board

Figure 2-6. Data I/O Connector (J8) Removal/Installation

Auxiliary 1 Connector and Pinouts (J9)

The auxiliary 1 (AUX 1) connector provides:

- MOD and DEMOD (TTL) faults
- Satellite clock
- Satellite I&Q
- Automatic Gain Control (AGC) output voltage

The faults are open collector levels that indicate a modulator or demodulator failure. A logic “1” indicates the faulted condition.

AGC_OUT is a programmable voltage, 0 to 10V, for a receive signal level between -25 and -60 dBm.

AUX 1 connection is a 9-pin female D connector (J9) located on the rear panel of the modem. Screw locks are provided for mechanical security on the mating connector. Refer to Table 2-9 for pinout information.

Table 2-9. AUX 1 Connector and Pinouts (J9)

Pin #	Signal Function	Name
1	Satellite Clock -	SAT_CLK-
2	No Connection	NC
3	Satellite Clock +	SAT_CLK+
4	MODULATOR TTL Fault	MDFLTTTL
5	Ground	GRN
6	RX_Q	RX Q Channel Eye
7	DEMODULATOR TTL Fault	
8	RX 1 Channel Eye	RX_1
9	AGC Output	AGC

Alarms Connector and Pinouts (J10)

The alarm connector provides Form C contact closures for alarm reporting. The two Form C summary fault contacts are Modulator and Demodulator.

The alarm connection is a 9-pin female D connector (J10) located on the rear panel of the modem. Screw locks are provided for mechanical security on the mating connector. Refer to Table 2-10 for pinout information.

Table 2-10. Alarms Connector and Pinouts (J10)

Pin #	Signal Function	Name
1	Alarm 1 is faulted	NO
2		COM
3	Alarm 1 is not faulted	NC
4	Alarm 2 is faulted	NO
5		COM
6	Alarm 2 is not faulted	NC
7	Alarm 3 is faulted	NO
8		COM
9	Alarm 3 is not faulted	NC

- Alarm 1 = Not used
- Alarm 2 = TX
- Alarm 3 = RX

RF Output Connector (CP1)

70/140 MHz Configuration

CP1 is a BNC connector for the TX IF signal. The output impedance is 75Ω and the output return loss is ≥ _20 dB. In normal operation, the output will be a QPSK (Optional: OQPSK) or BPSK modulated result of the Data I/O connector between 50 and 180 MHz, in 1 Hz steps.

L-Band Configuration

CP1 is a Type N connector for the TX IF signal. The output impedance is 50Ω and the output return loss is ≥ -15 dB. In normal operation, the output will be a QPSK (Optional: OQPSK) or BPSK modulated result of the Data I/O connector between 950 to 1750 MHz, in 100 Hz steps.

External Reference (CP2)

CP2 is a BNC connector for an EXT REF. The input impedance is 75Ω. For normal operation, the desired carrier signal level is ≥ 0 dB.

EXT REF frequencies are EXT 1, EXT 5, EXT 10, and EXT 20 MHz.

RF Input Connector (CP3)

CP3 is a Type N connector for an RX IF signal. The input impedance is 75Ω (Optional: 50Ω). And the input return loss is ≥ 10 dB from 950 to 1750 MHz.

AC Power Connector

A standard, detachable, non-locking, 3-prong power cord (IEC plug) supplies the Alternating Current (AC) power to the modem. Observe the following:

Input Power	55W maximum, 40W typical
Input Voltage	90 to 132 or 175 to 264 VAC Unit switches ranges automatically
Connector Type	I.E.C
Fuse Protection	1A slo-blo Line and neutral fusing 5 mm type fuses

Ground Connector (GND)

A #10-32 stud on the rear panel of the modem is used for connecting a common chassis ground among all equipment.

Note: The AC power connector provides the safety ground.

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3 Chapter 3. OPERATION

This chapter describes the operation of the SDM-300L using the front panel menus.

3.1 Front Panel

The modem front panel (Figure 3-1) enables control of modem configuration parameters and displays the modem status.

Figure 3-1. Front Panel View

The front panel features include:

- 32-character, 2-line LCD display
- 6-button keypad for local control
- 10 LEDs to provide overall status at a glance

All functions are accessible at the front panel by entering one of six pre-defined Function Select categories or levels:

- Configuration
- Monitor
- Faults/Alarms
- Stored Faults/Alarms
- Remote AUPC (ASYNC mode only)
- Utility

3.1.1 LED Indicators

The 10 LEDs on the front panel indicate:

- General modem summary faults
- Status
- Alarms

The indicators are defined in Table 3-1 as follows:

Table 3-1. LED Indicators

Name	LED	Description
Faults		
Transmit	Red	A fault condition exists in the transmit chain.
Receive	Red	A fault condition exists in the receive chain.
Common	Red	A common equipment fault condition exists.
Stored	Yellow	A fault has been logged and stored. The fault may or may not be active.
Status		
Power On	Green	Power is applied to the modem.
Transmitter On	Green	Transmitter is currently on. This indicator reflects the actual condition of the transmitter, as opposed to the programmed condition.
Carrier Detect	Green	Decoder is locked.
Test Mode	Yellow	Flashes when the modem is in a test configuration.
Alarms		
Transmit	Yellow	A transmit function is in an alarm condition.
Receive	Yellow	A receive function is in an alarm condition.

3.1.2 Front Panel Keypad

The front panel keypad permits local operation of the modem. The keypad consists of six keys (Figure 3-2).

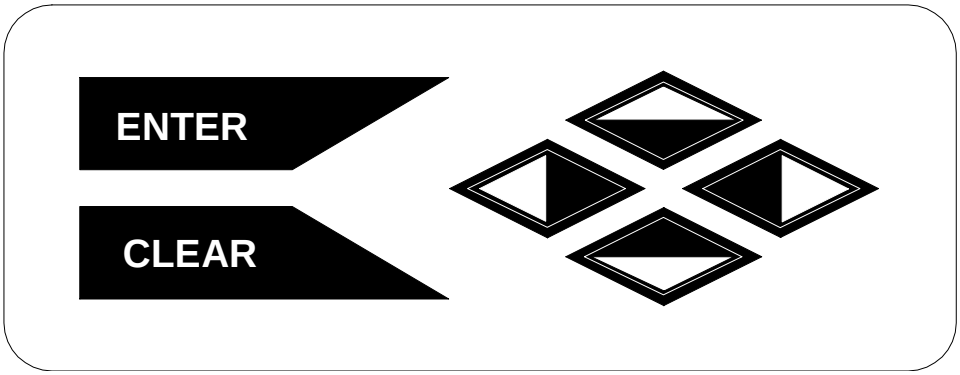


Figure 3-2. Keypad

Each key provides one or more logical functions. These functions are defined in the following table.

ENTER	This key is used to select a displayed function or to execute a modem configuration change.
CLEAR	This key is used to back out of a selection or to cancel a configuration change which has not been executed using [ENTER]. Pressing [CLEAR] generally returns the display to the previous selection.
Left and Right Diamond Keys	These keys are used to move to the next selection or to move the cursor functions. **Note:** Throughout this chapter, [←] and [→] are used to indicate left and right diamond keys.
Top and Bottom Diamond Keys	These keys are used primarily to change configuration data (numbers). At times, they are also used to move from one section to another. **Note:** Throughout this chapter, [↑] and [↓] are used to indicate top and bottom diamond keys.

The modem responds by beeping whenever a key is pressed:

- A single beep indicates a valid entry and the appropriate action was taken.
- A double beep indicates an invalid entry or a parameter is not available for operation.

3.2 Menu System

Note: The menus show features and options that are not available. However, they are shown to preserve the menu structure and reserve the structure for the future. This does not imply an intent or obligation to add these features or options in the future.

To access and execute all functions, refer to Figure 3-3 through Figure 3-22. Use the Main menu in Figure 3-3 as a quick reference for accessing the modem functions.

When the modem power is applied, the base level of the menu system displays the sign-on message:

- Line 1 of the sign-on message is the modem model number and type.
- Line 2 is the version number of the firmware.

The main level of the menu system is Function Select. To access this level from the sign-on message, press the [←] or [→] keys. From the Function Select menu; select one of the functional categories:

- Configuration
- Monitor
- Faults/Alarms
- Stored Faults/Alarms
- Remote AUPC (ASYNC mode only)
- Utility

Press [←] or [→] to move from one selection to another. When line 2 displays the desired function, select that level by pressing [ENTER]. After entering the appropriate functional level, press [←] or [→] to move to the desired function.

To view or change the modem's configuration, enter the Configuration level from the Function Select menu. Once in the Configuration menu, press [←] or [→] to scroll through the Configuration menu selection:

- Modulator
- Demodulator
- Interface
- Local AUPC (ASYNC Mode or Local Modem AUPC only)
- MUX (Optional)
- Save
- Recall

Press [ENTER] to select the desired Configuration menu option. To view the options for the selected configuration parameters, press [←] or [→]. To change a configuration parameter, press [ENTER] to begin the change process.

Press [↑] or [↓] to change the parameters. After the display represents the correct parameters, press [ENTER] to execute the change. This action initiates the necessary programming by the modem.

To undo a parameter change prior to execution, press [CLEAR].

Notes:

1. Figure 3-3 list the front panel menu window selections.
2. ComTech EFdata recommends that selection of the desired Modem Type be made prior to making any other setting. This procedure is located in the Utility Modem Type menu.
3. Menus or commands that are specific to certain modem configurations are only accessible after selecting the appropriate modem configuration. This prevents incompatible parameters from accidentally being selected.
4. All of the windows are accessible in the Custom mode. Take caution not to select incompatible parameters, as the modem does not shut out incompatible command choices in the Custom mode.

3.2.1 Code Rate and Data Rate Range

The following code rates and data rate range apply to the SDM-300L.

Code Rate	Data Rate Range
BPSK 1/2	2.4 to 1250 kbit/s
QPSK 1/2	4.8 to 2500 kbit/s
QPSK 3/4	7.2 to 3750 kbit/s
QPSK 7/8	8.4 to 4375 kbit/s
OQPSK 1/2	4.8 to 2500 kbit/s
OQPSK 3/4	7.2 to 3750 kbit/s
OQPSK 7/8	8.4 to 4375 kbit/s
BPSK 1/1	4.8 to 2500 kbit/s
QPSK 1/1	9.6 to 5000 kbit/s

Note: In some applications the practical lower data rate is typically 19.2 kbit/s, or higher, depending upon the performance of equipment used in conjunction with the SDM-300L. These applications include the use of a BUC or an LNB.

3.2.2 Front Panel Menu

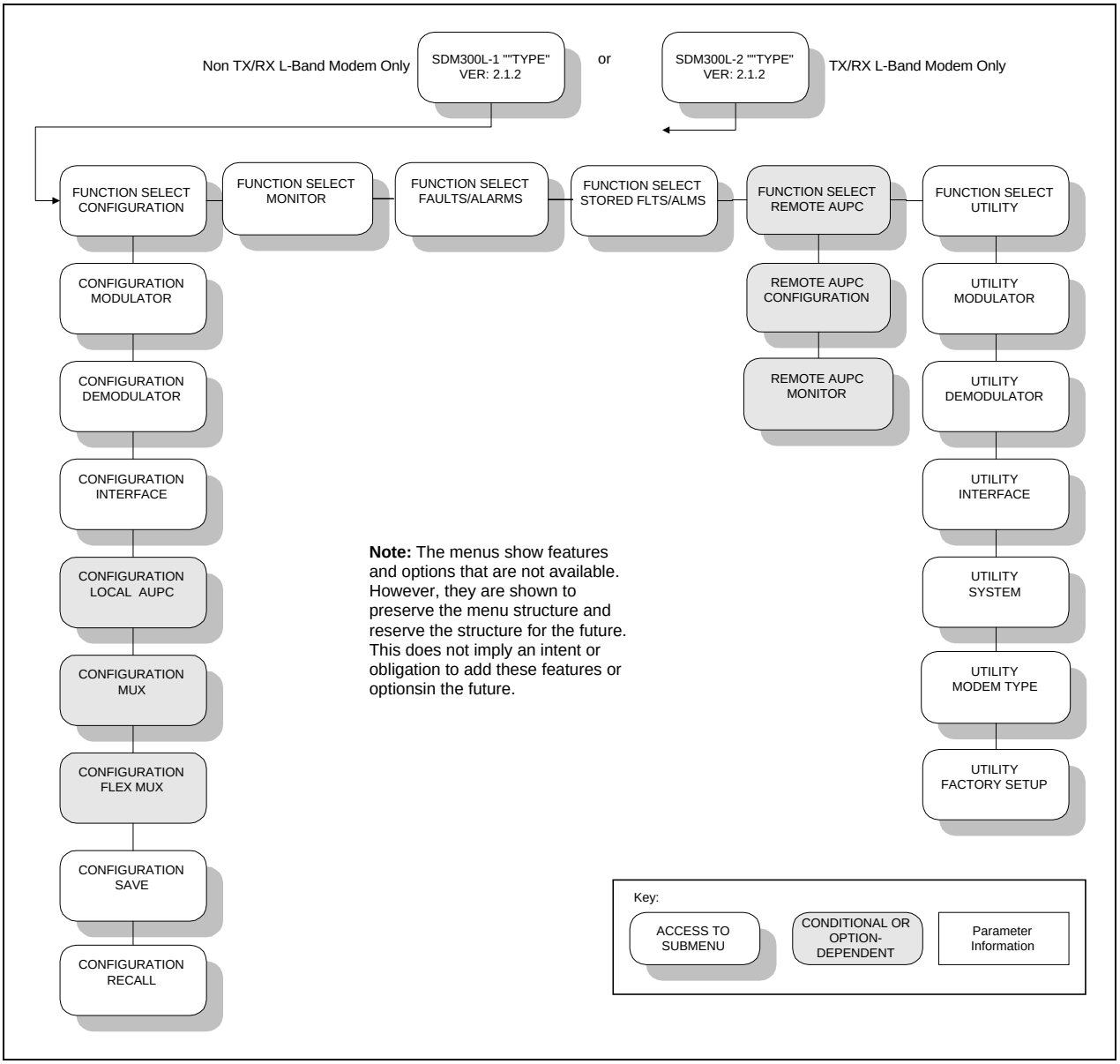


Figure 3-3. Main Menu

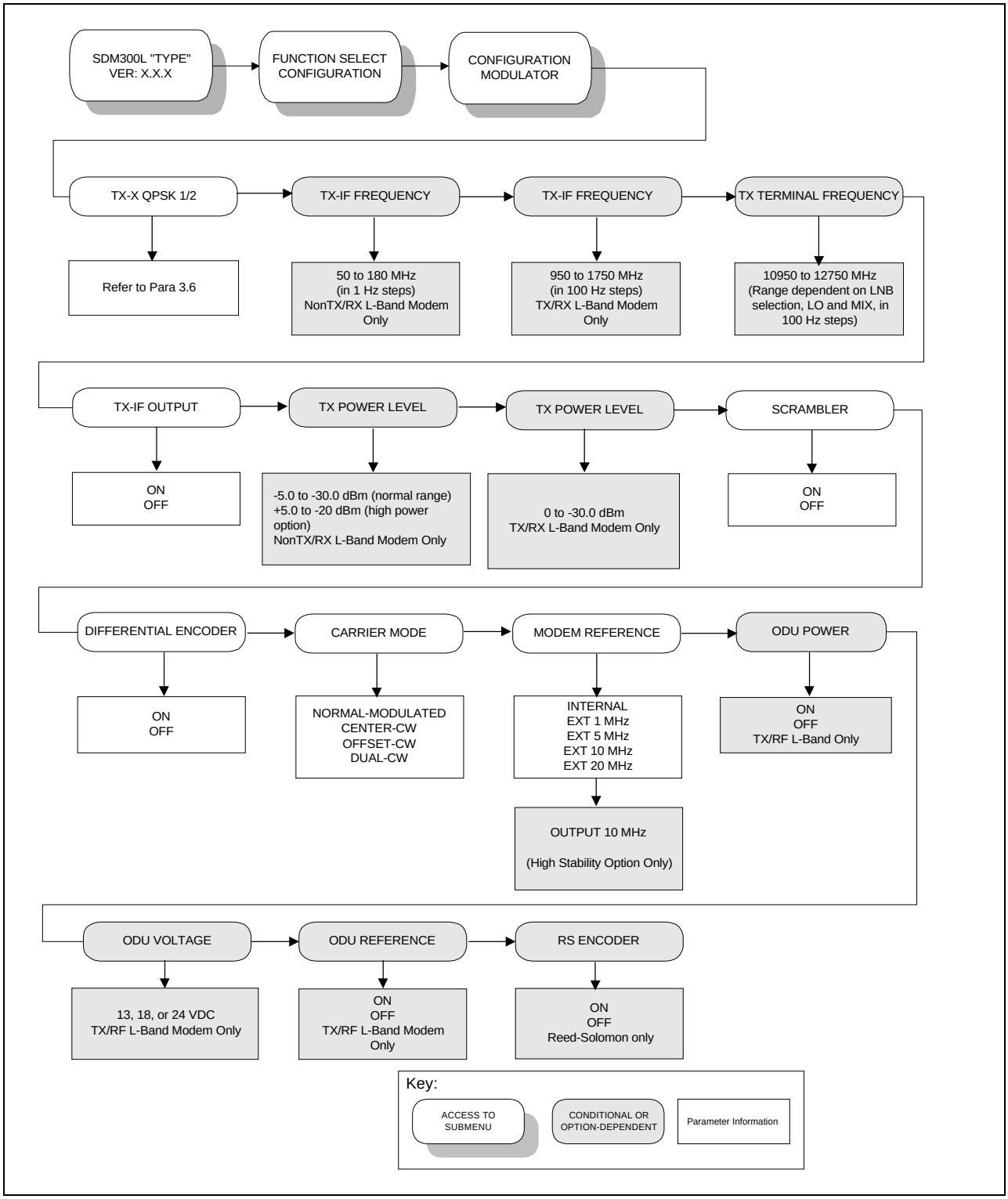


Figure 3-4. Configuration Modulator Menu

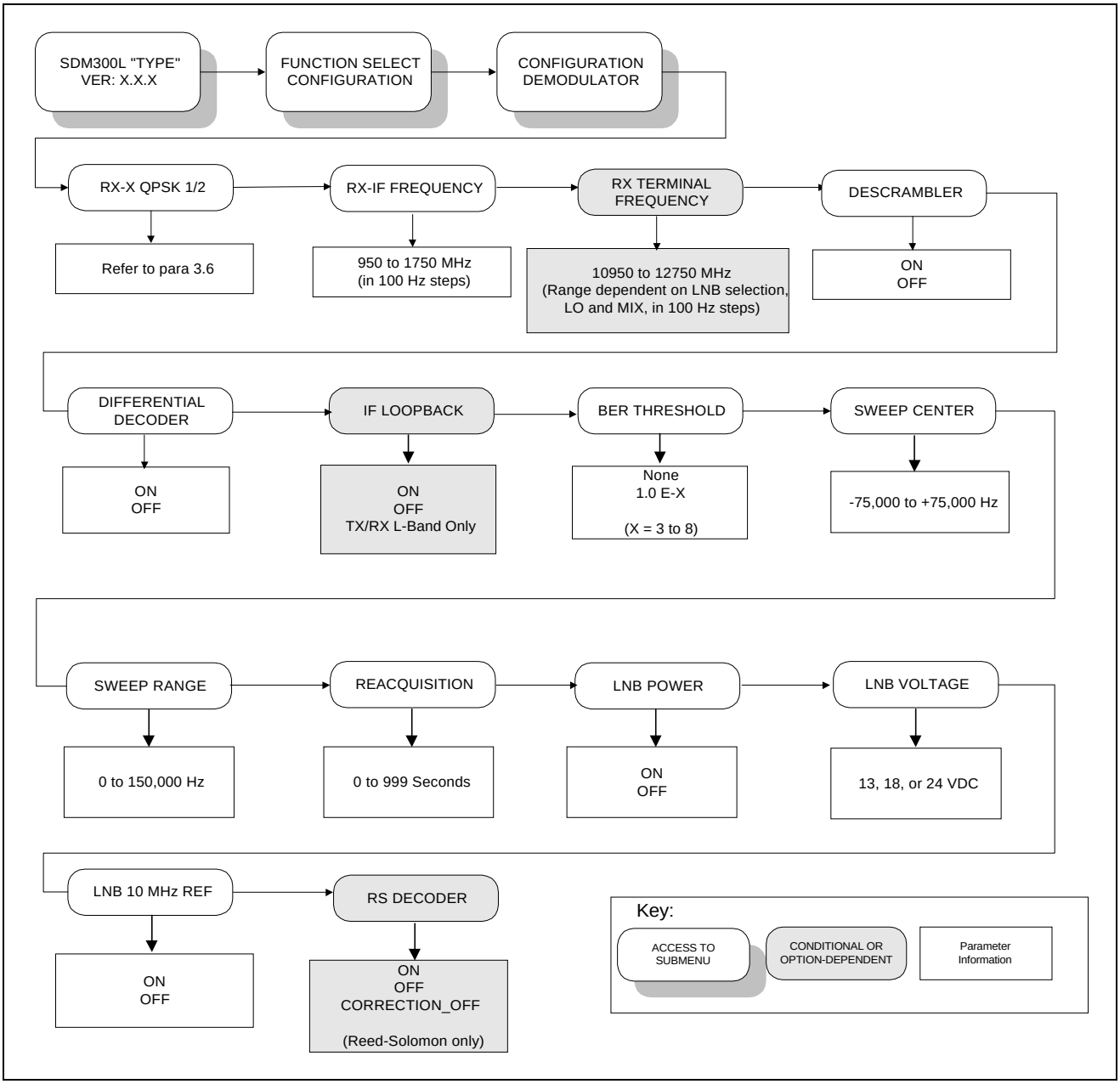


Figure 3-5. Configuration Demodulator Menu

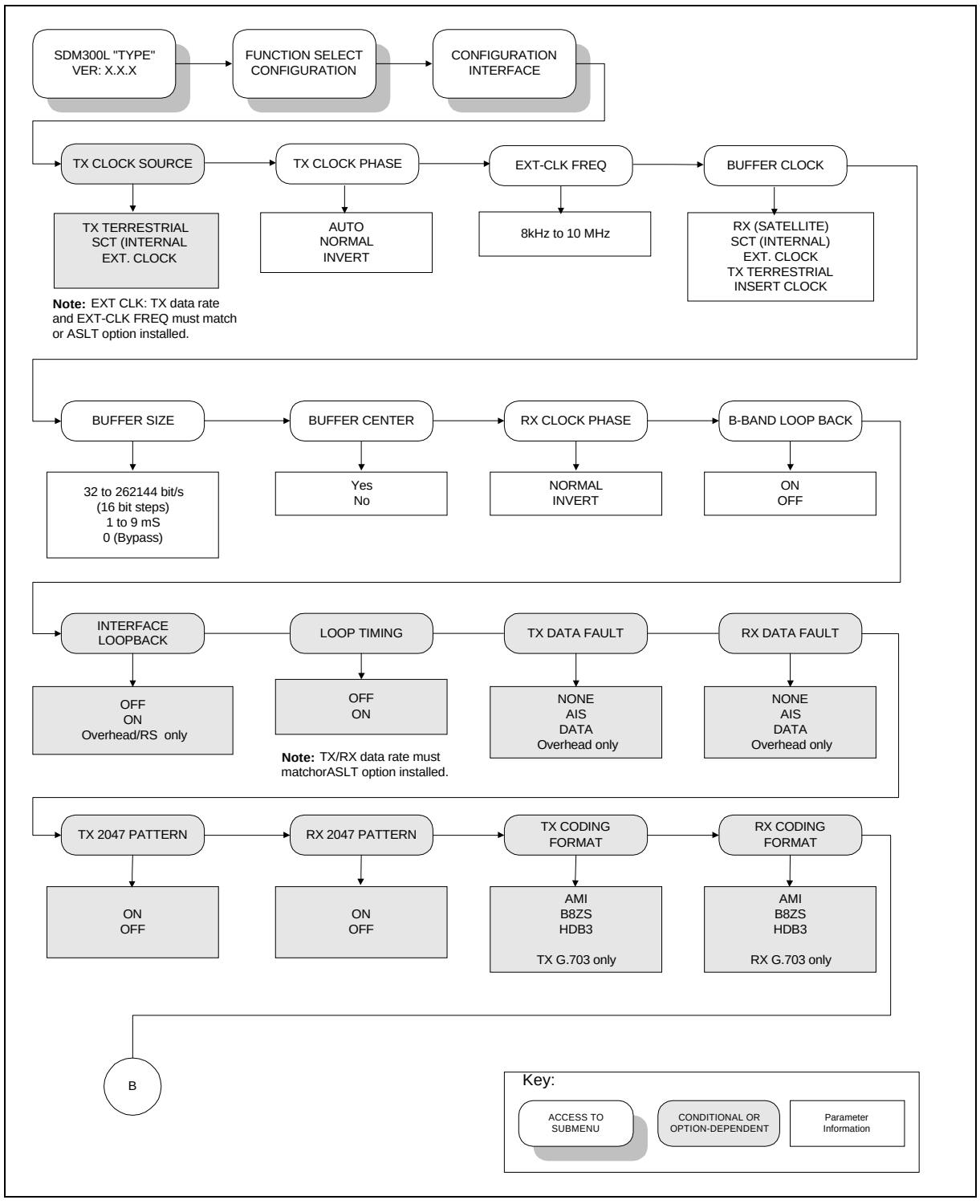


Figure 3-6. Configuration Interface Menu

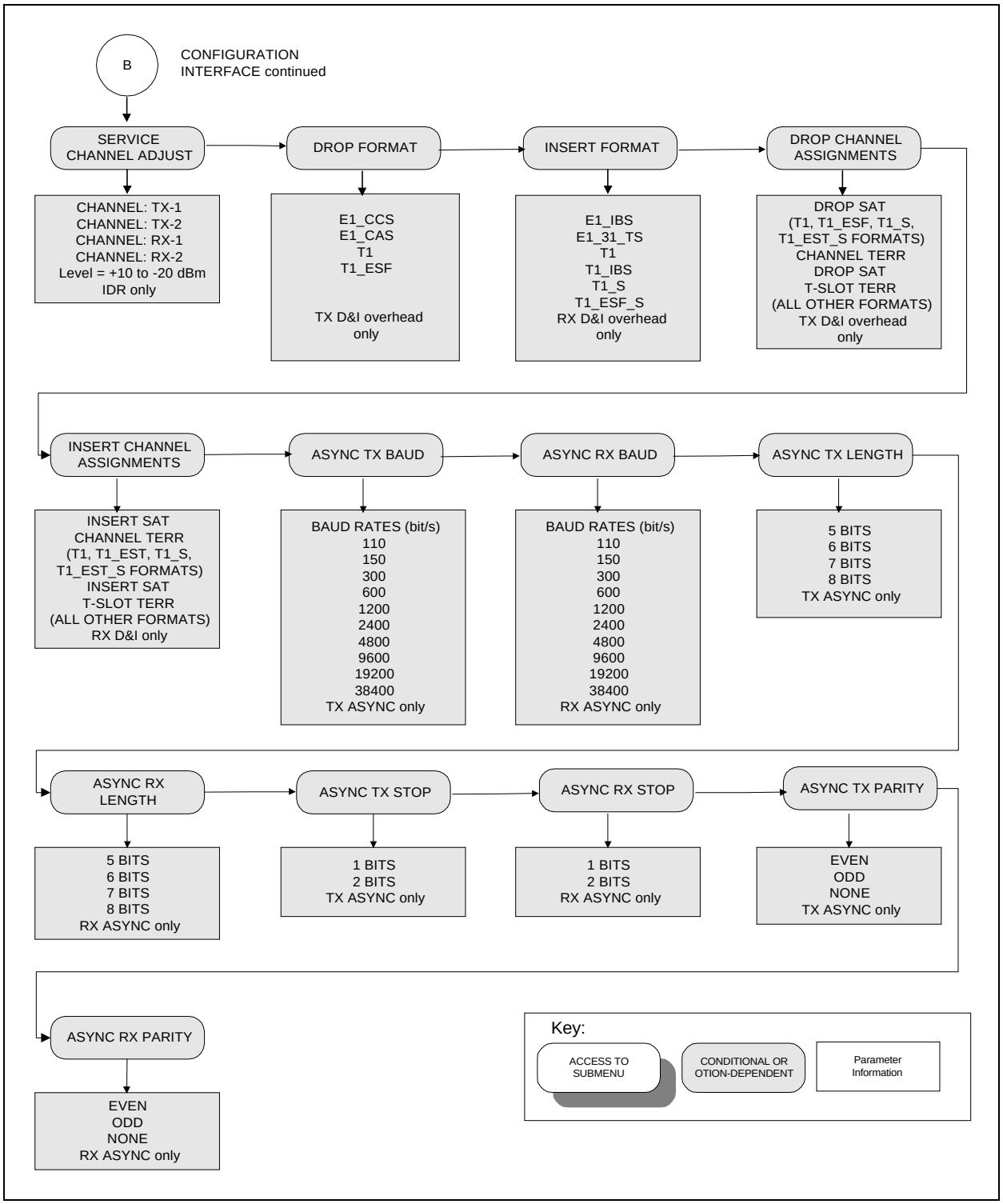


Figure 3-6. Configuration Interface Menu (Continued)

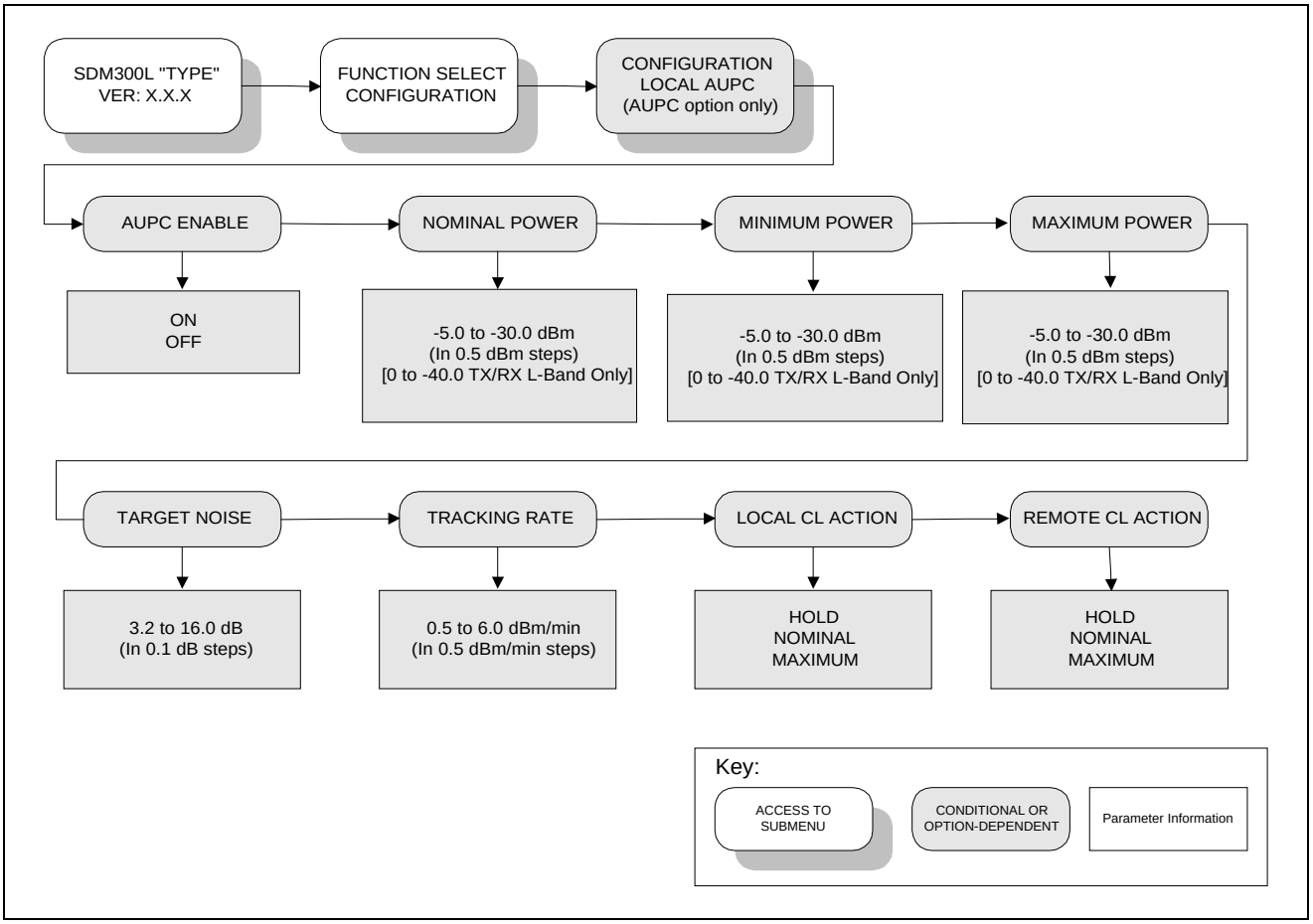


Figure 3-7. Configuration Local AUPC Menu

Notes:

1. Used for ASYNC/AUPC option and for self-monitoring local AUPC control.
2. Manufacturer does not recommend the tracking noise (E_b/N_0) be set within 15.5 and 16.0 dB.

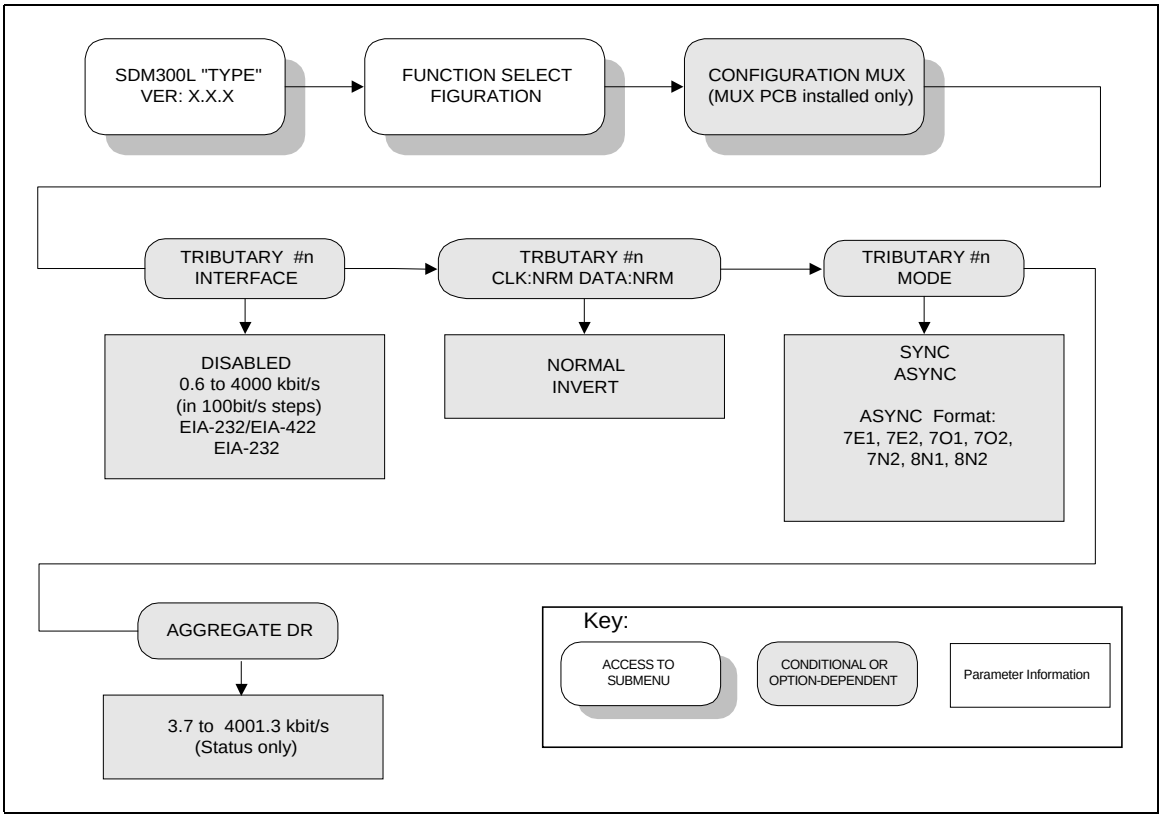


Figure 3-8. Configuration MUX

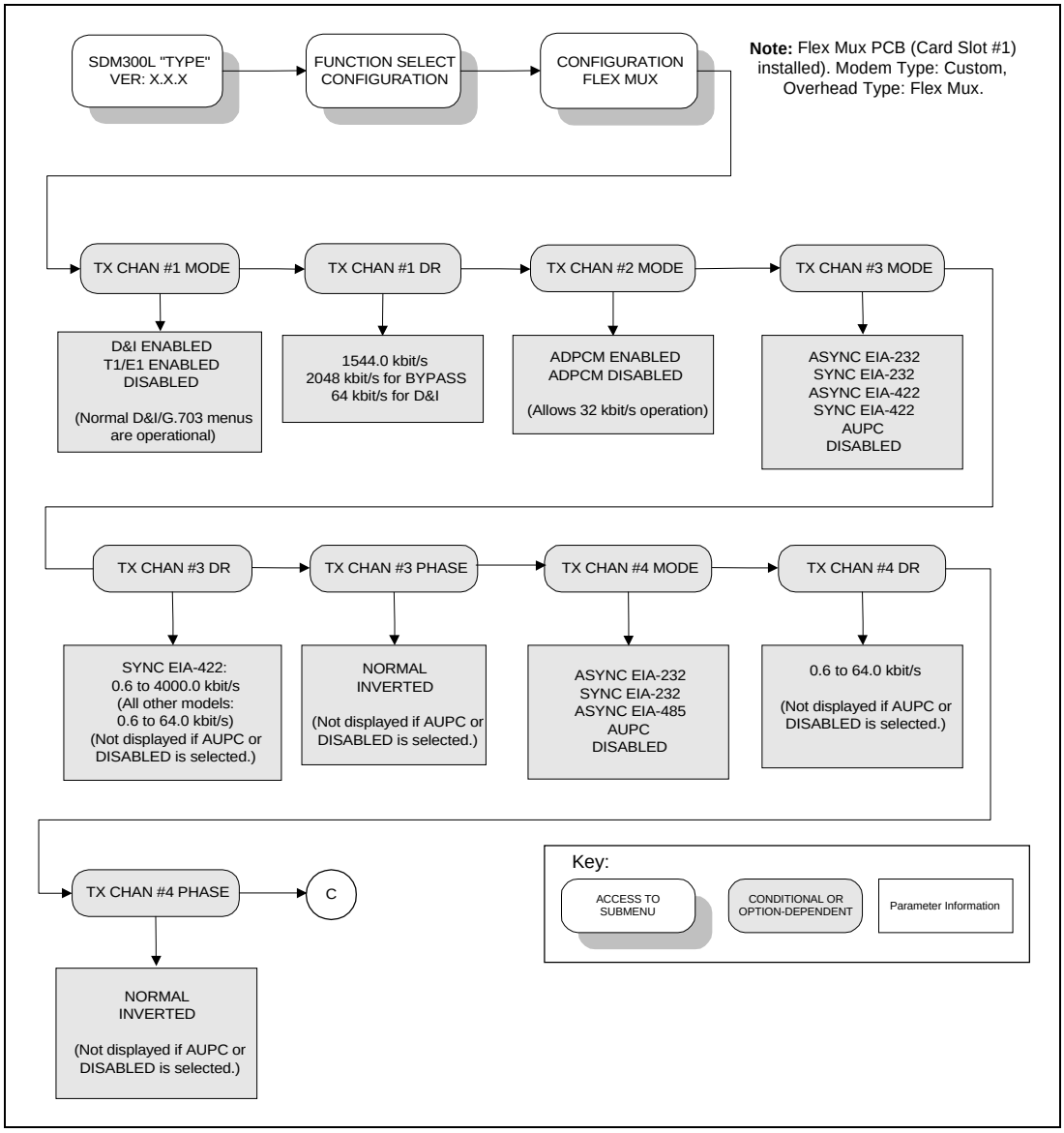
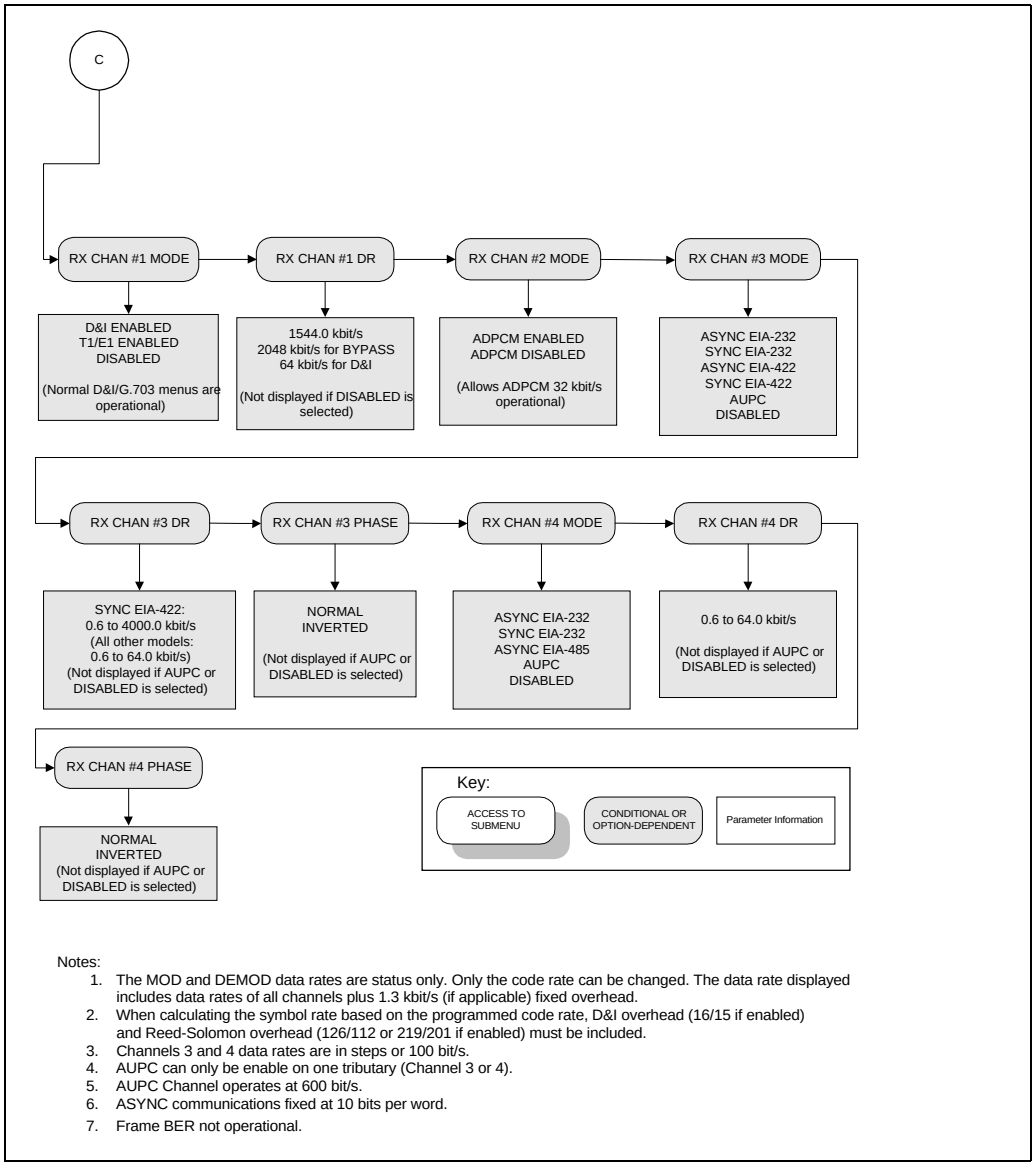


Figure 3-9. Configuration Flex Mux

Note: The Flex Mux Channel 1, D&I will operate with other modems that are set for D&I as long as Channels 2, 3, and 4 are Off.



Notes:

1. The MOD and DEMOD data rates are status only. Only the code rate can be changed. The data rate displayed includes data rates of all channels plus 1.3 kbit/s (if applicable) fixed overhead.
2. When calculating the symbol rate based on the programmed code rate, D&I overhead (16/15 if enabled) and Reed-Solomon overhead (126/112 or 219/201 if enabled) must be included.
3. Channels 3 and 4 data rates are in steps or 100 bit/s.
4. AUPC can only be enable on one tributary (Channel 3 or 4).
5. AUPC Channel operates at 600 bit/s.
6. ASYNC communications fixed at 10 bits per word.
7. Frame BER not operational.

Figure 3-9. Configuration Flex Mux (Continued)

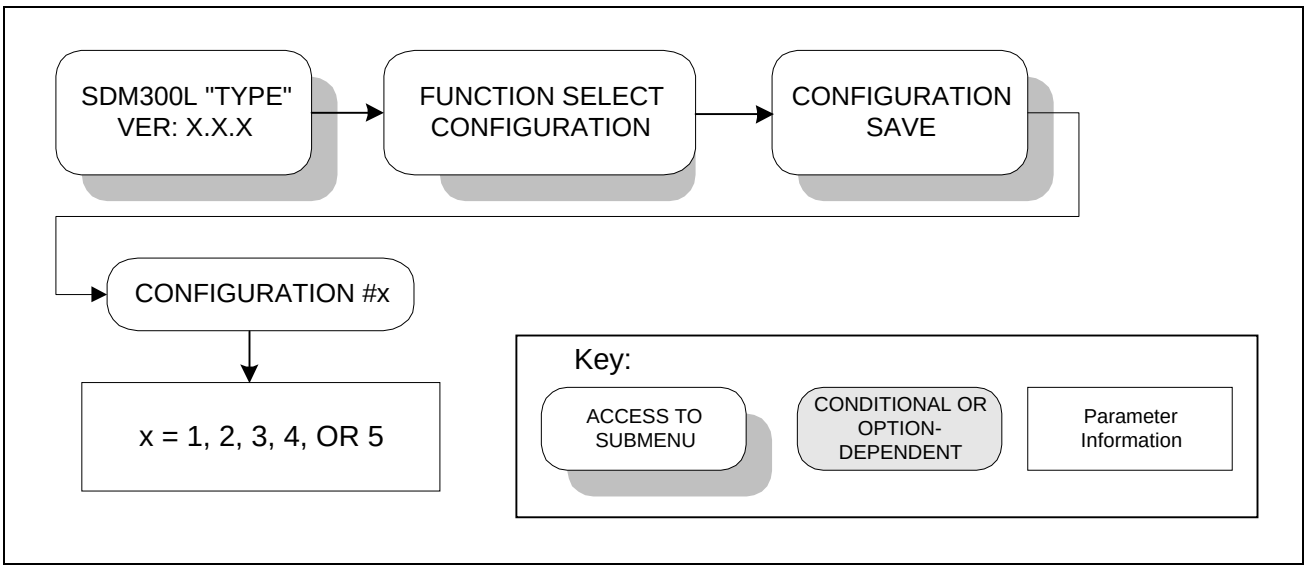


Figure 3-10. Configuration Save Menu

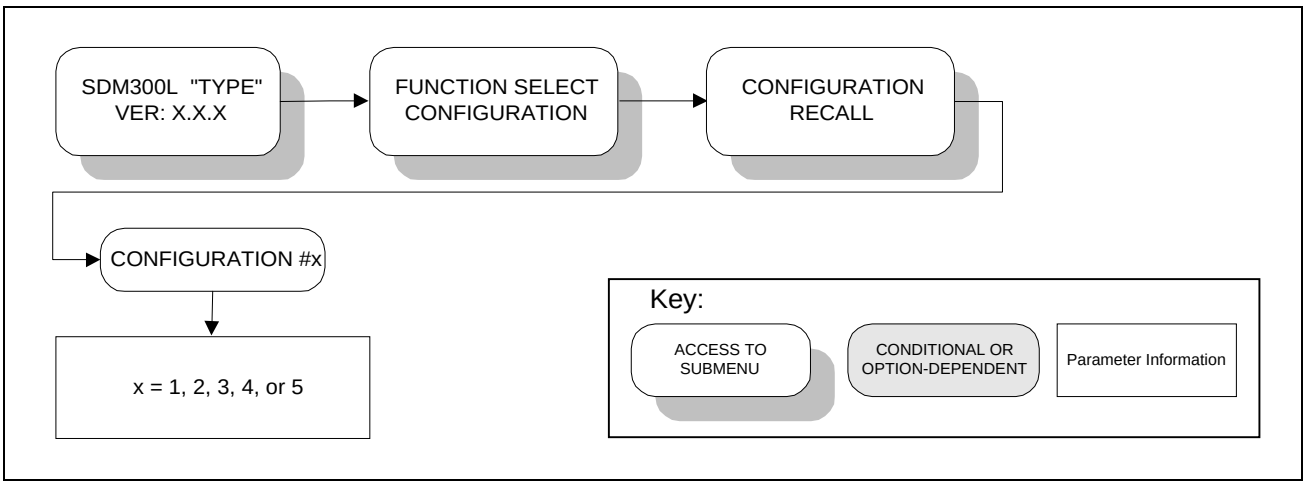


Figure 3-11. Configuration Recall Menu

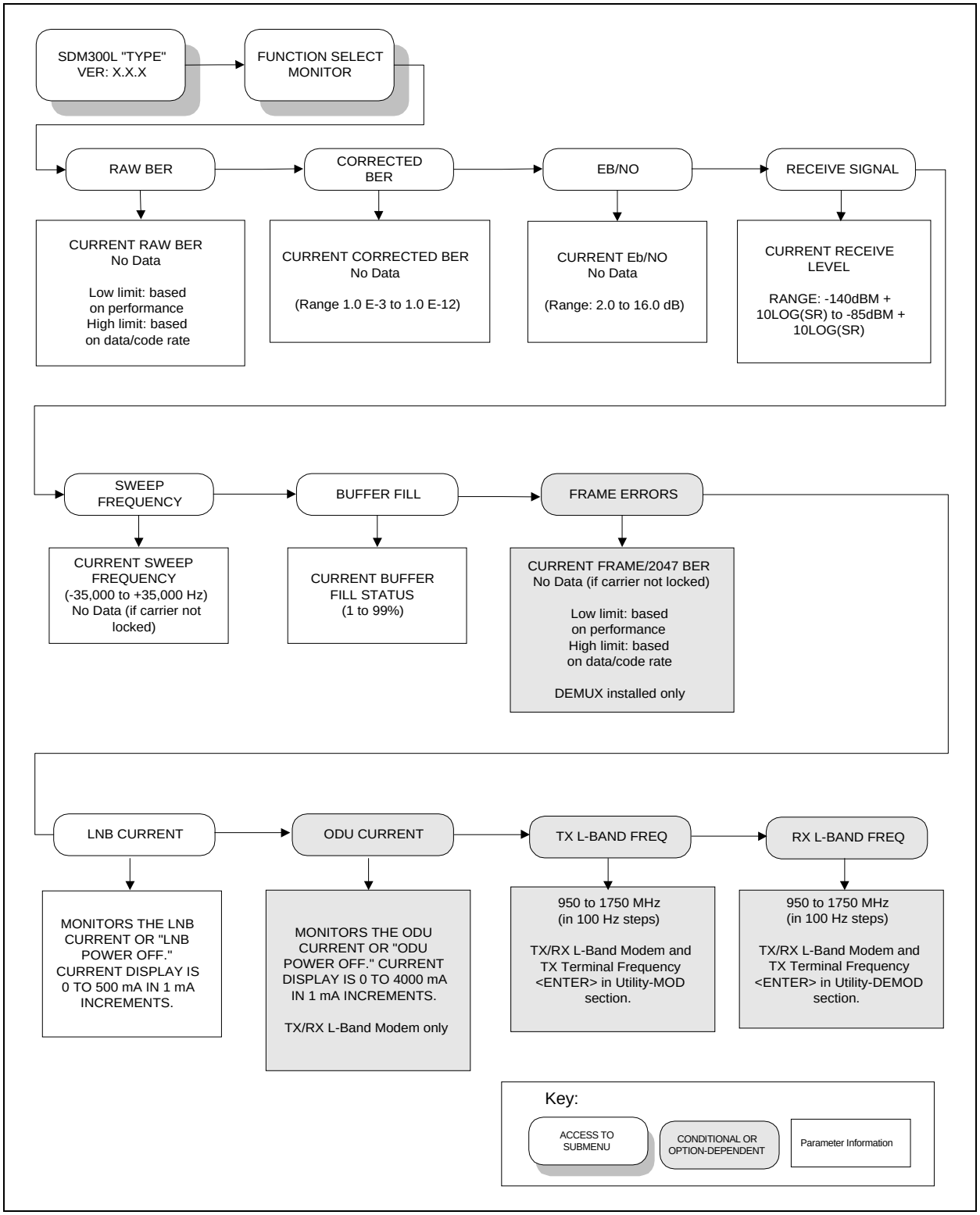


Figure 3-12. Monitor Menu

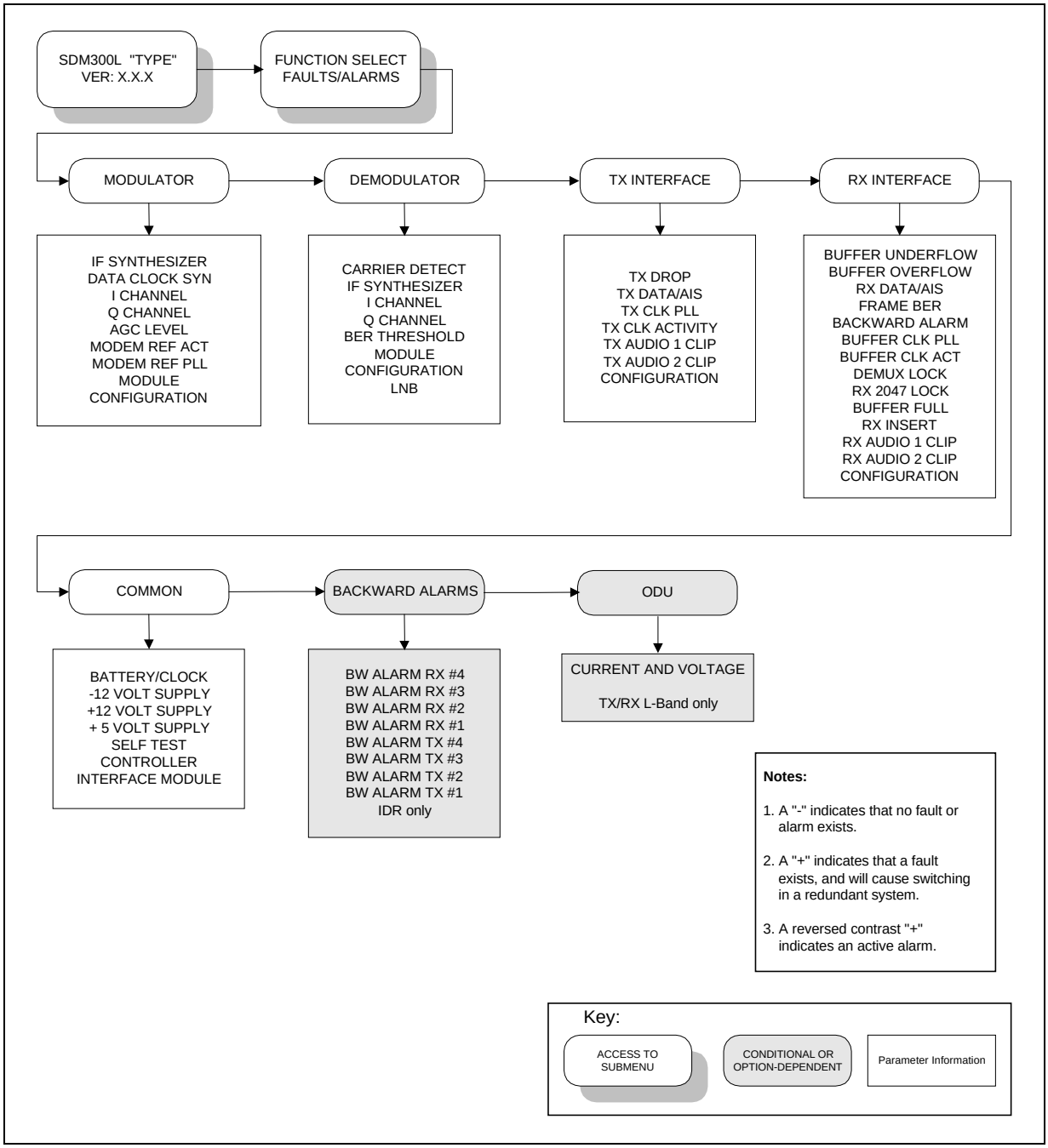


Figure 3-13. Faults/Alarms Menu

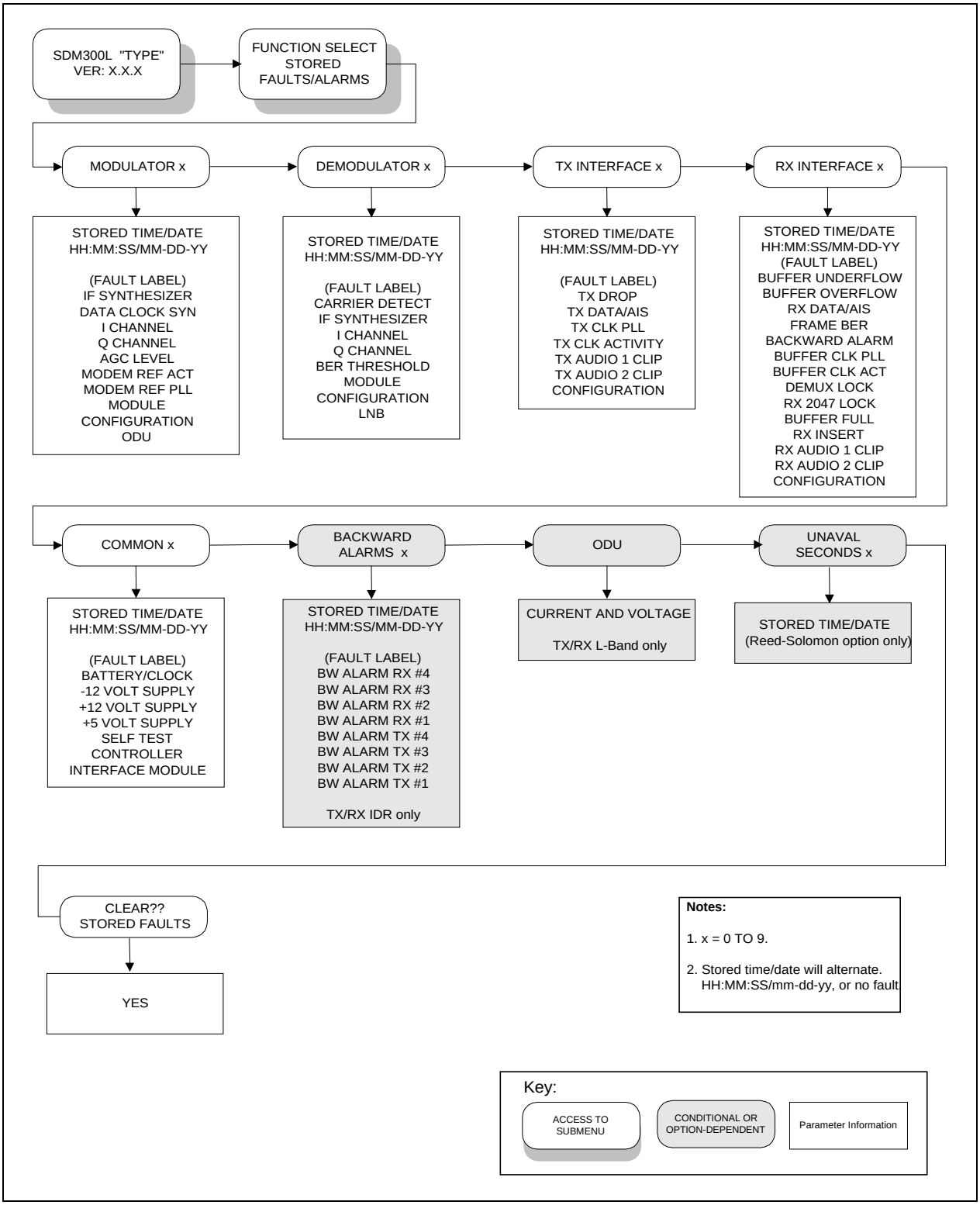


Figure 3-14. Stored Faults/Alarms Menu

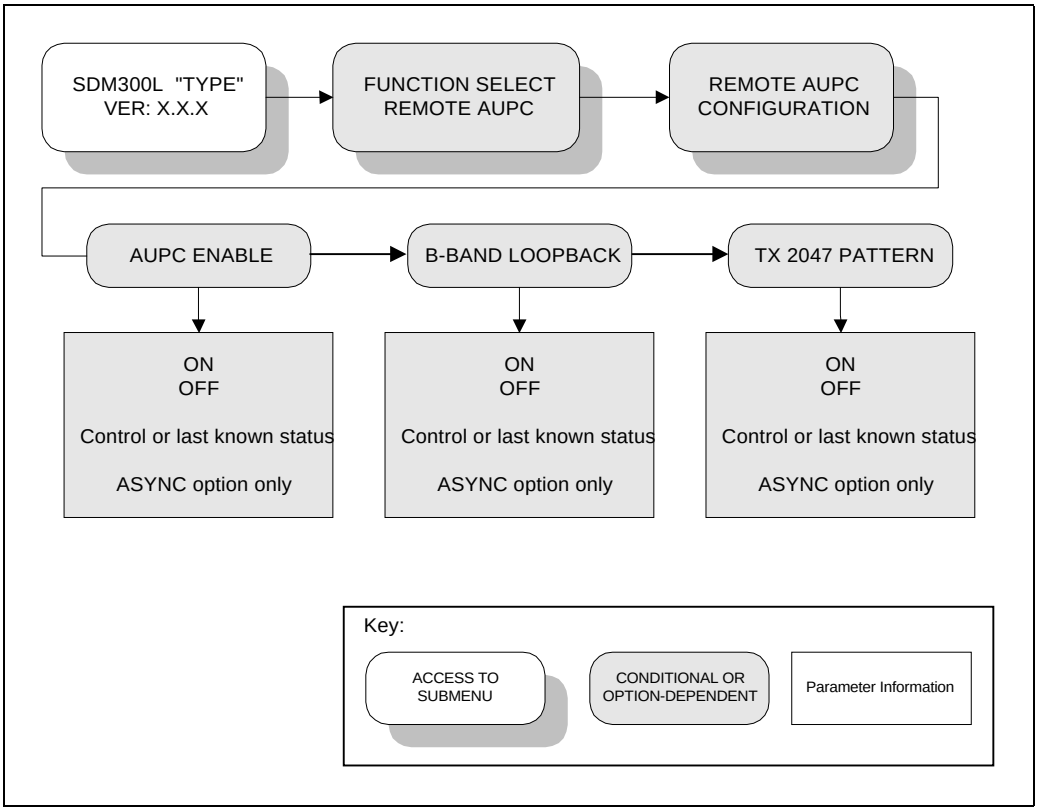


Figure 3-15. Remote AUPC Configuration Menu

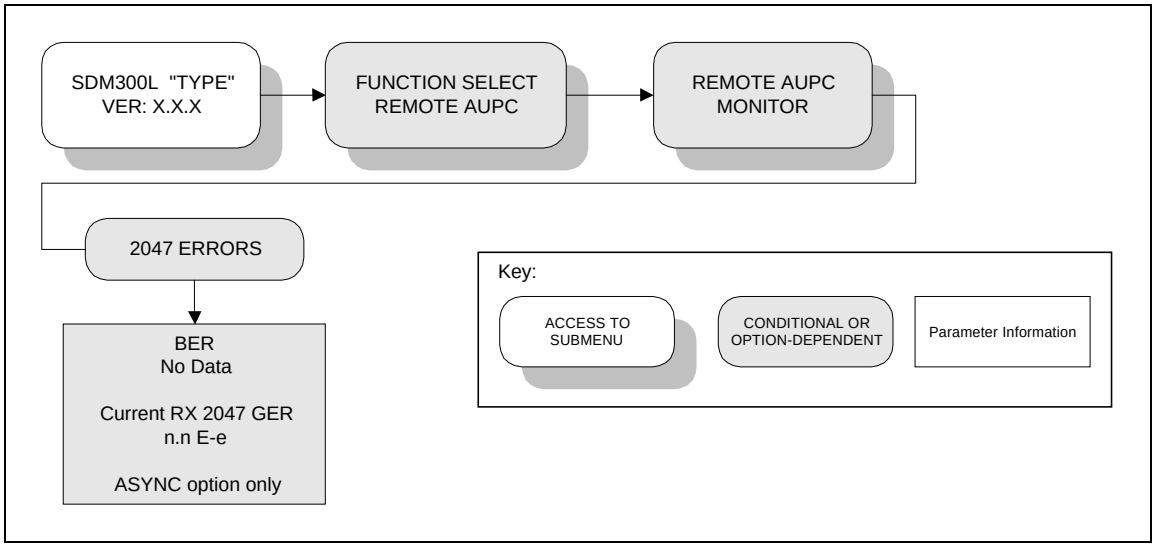


Figure 3-16. Remote AUPC Monitor Menu

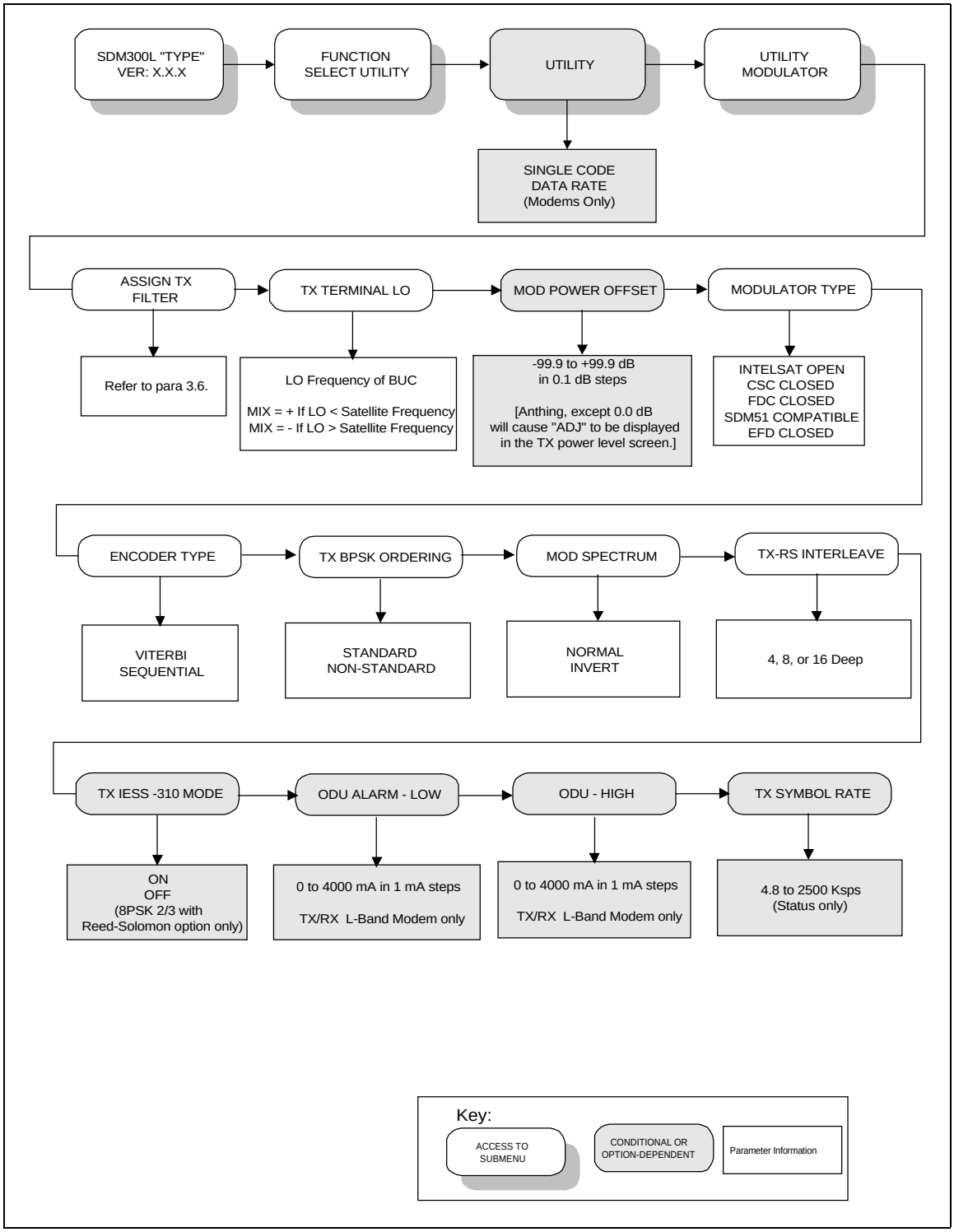


Figure 3-17. Utility Modulator Menu

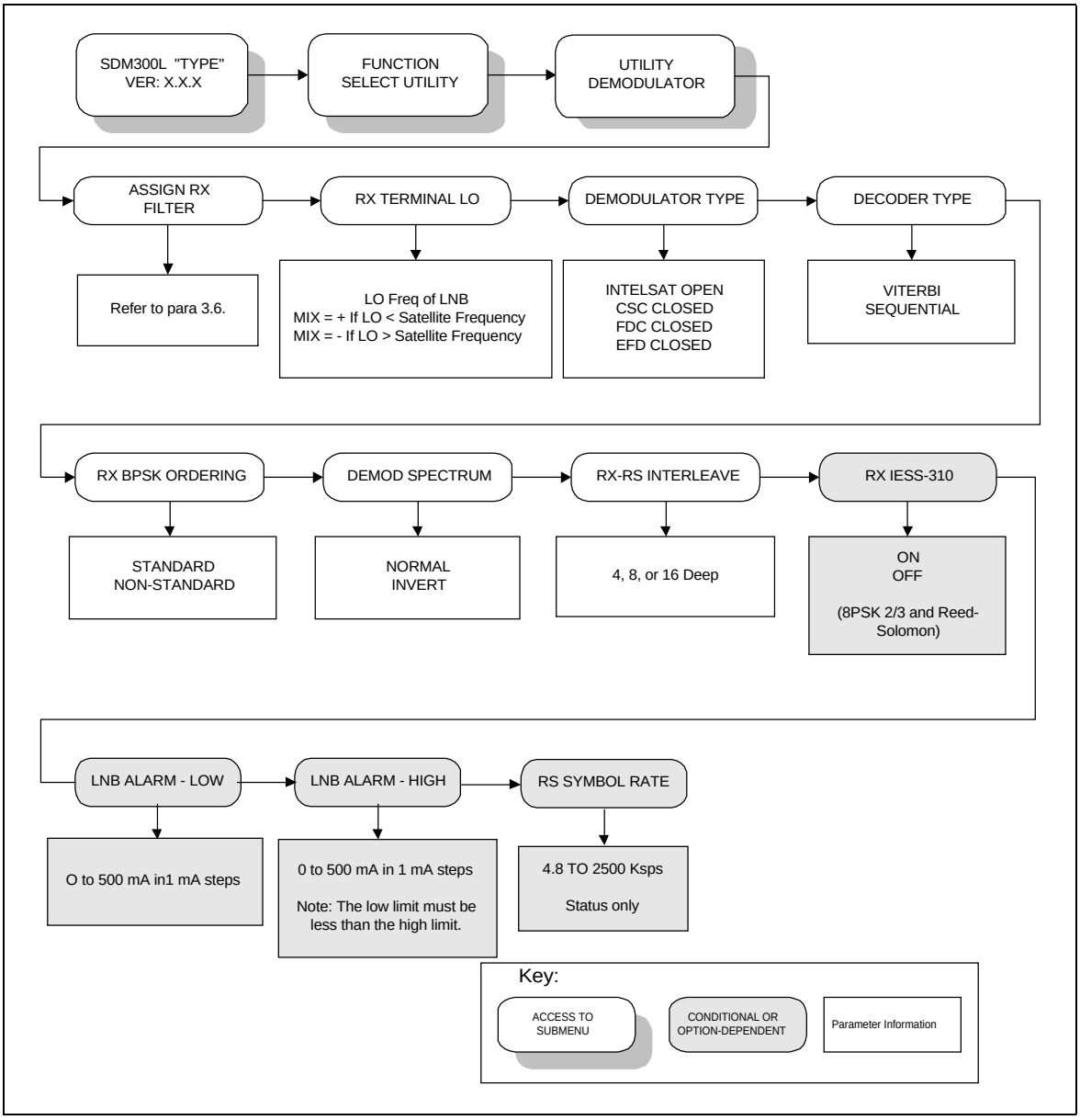


Figure 3-18. Utility Demodulator Menu

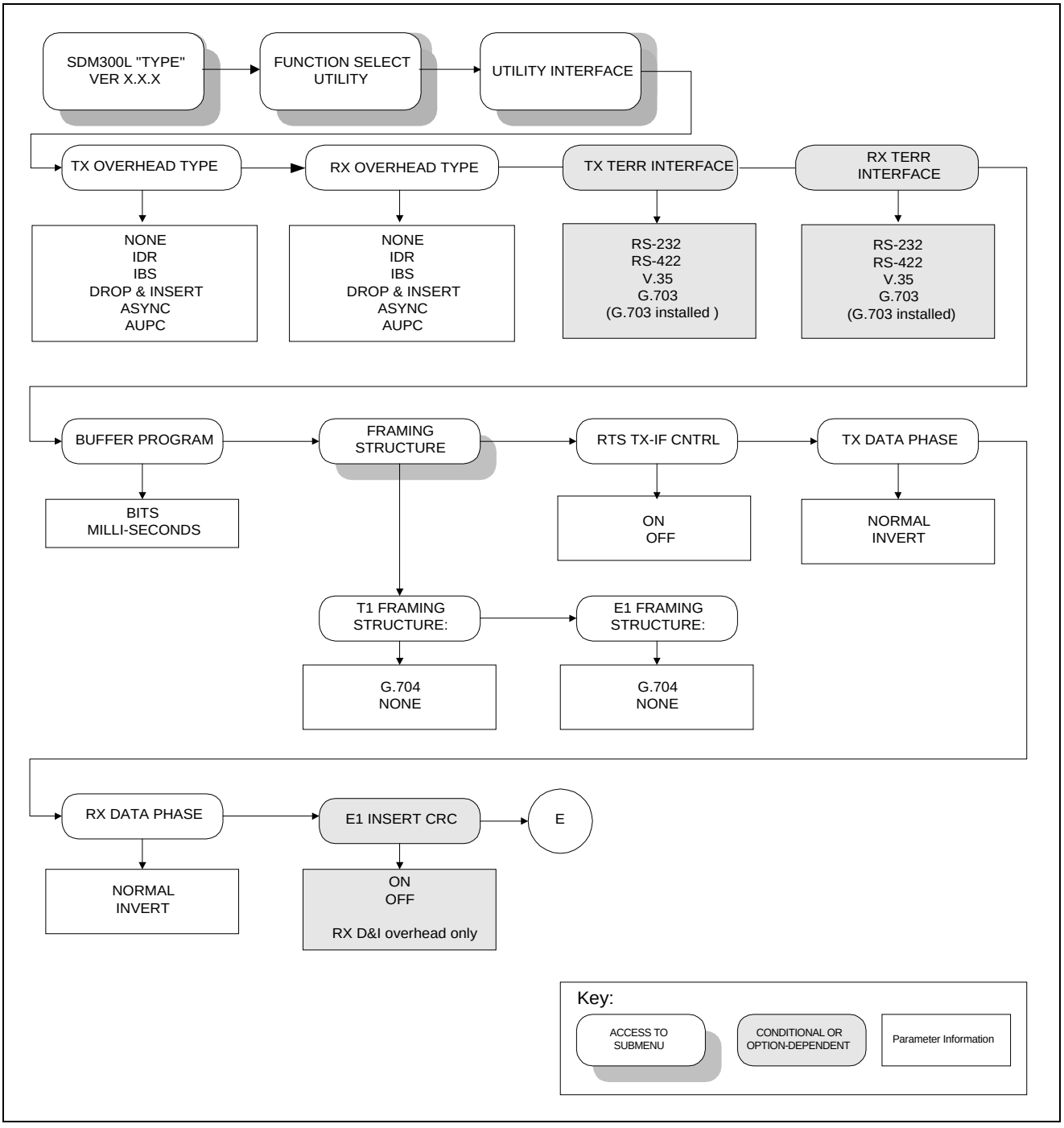


Figure 3-19. Utility Interface Menu

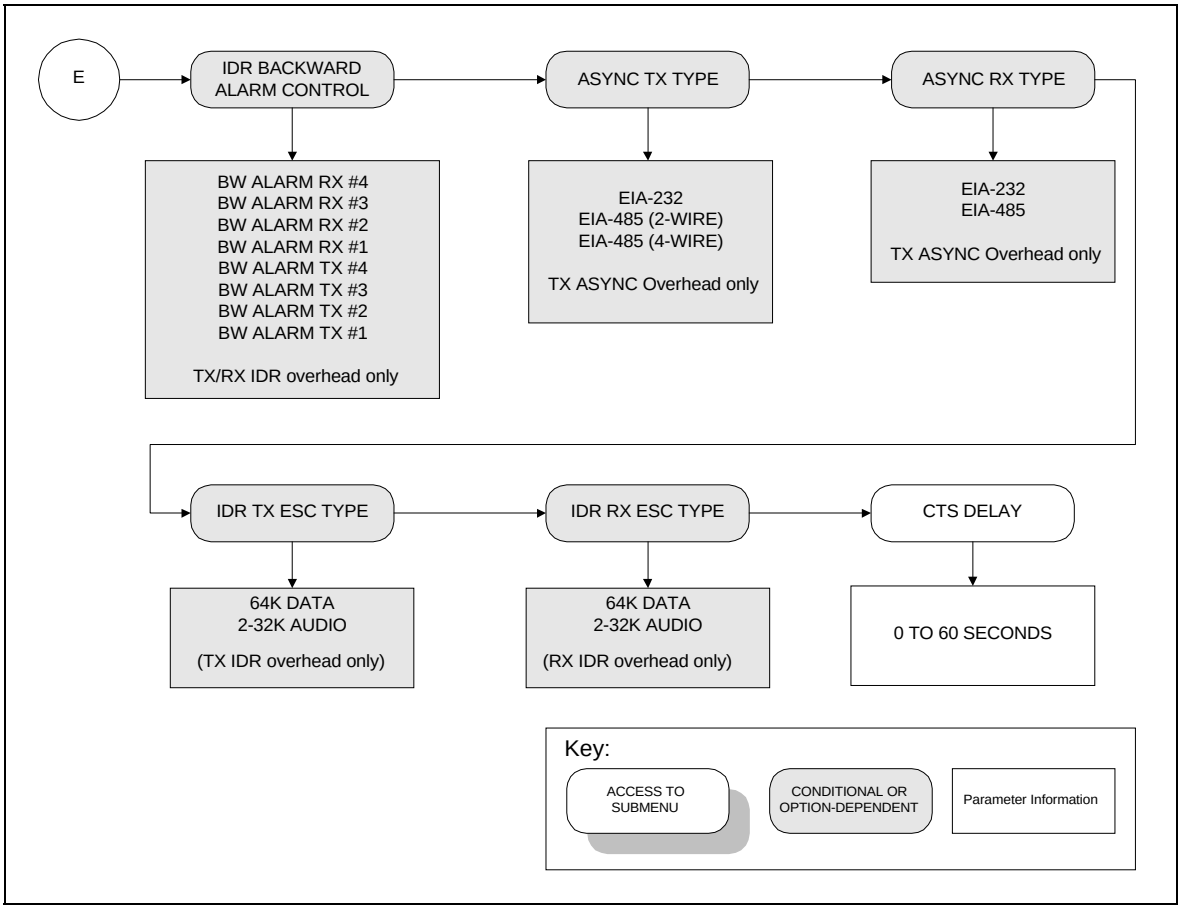


Figure 3-19. Utility Interface Menu (Continued)

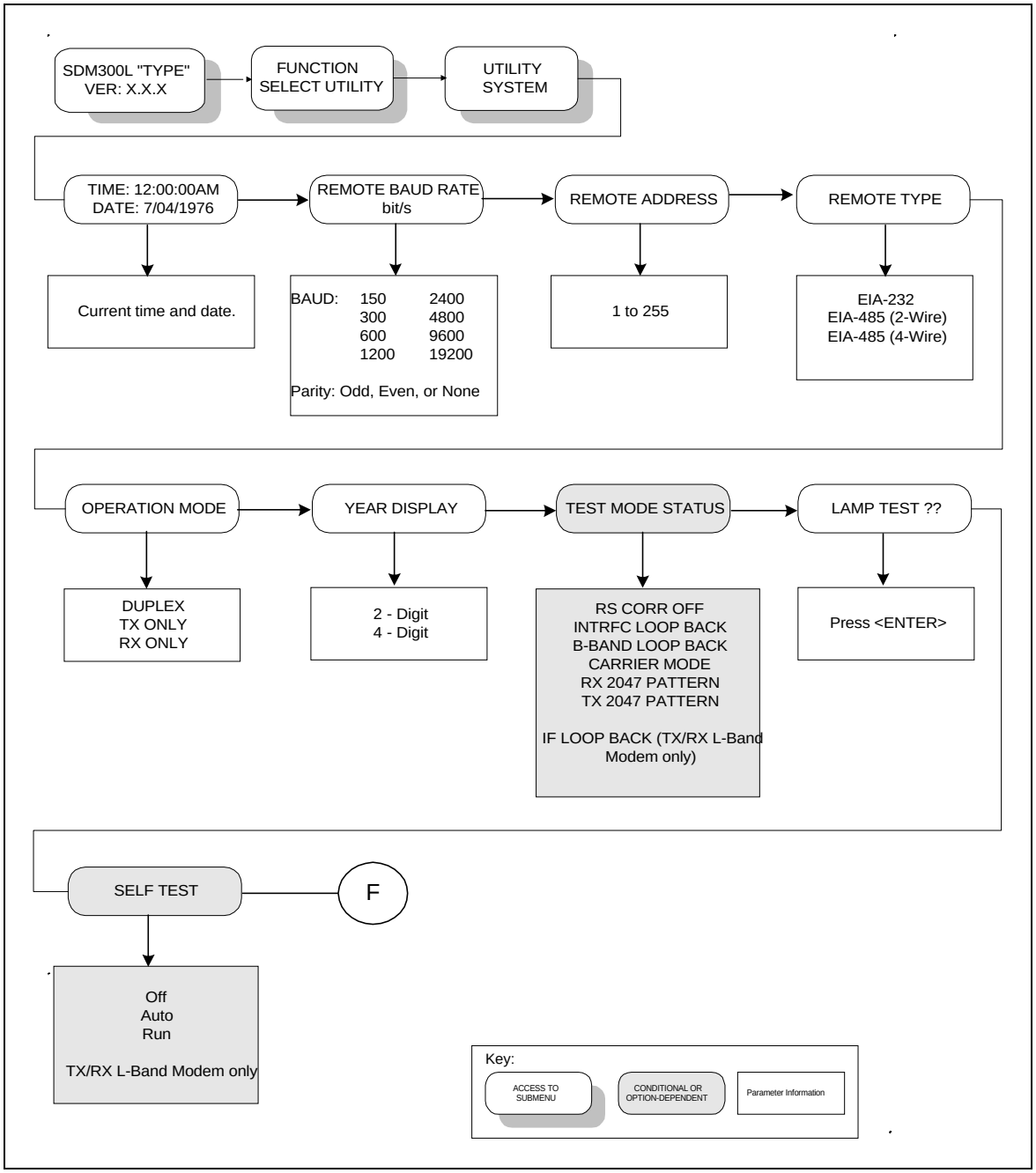


Figure 3-20. Utility System Menu

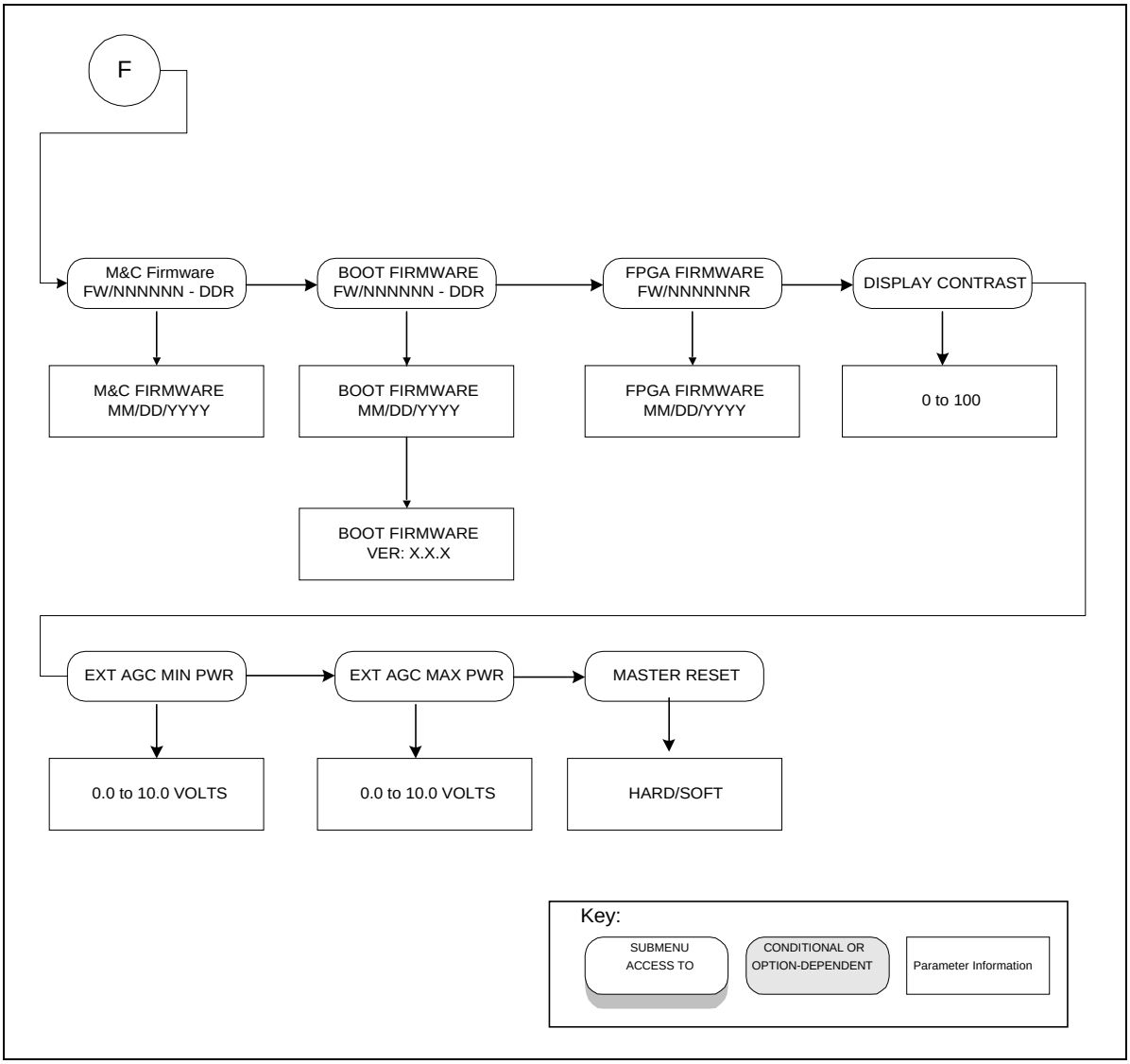


Figure 3-20. Utility System Menu (Continued)

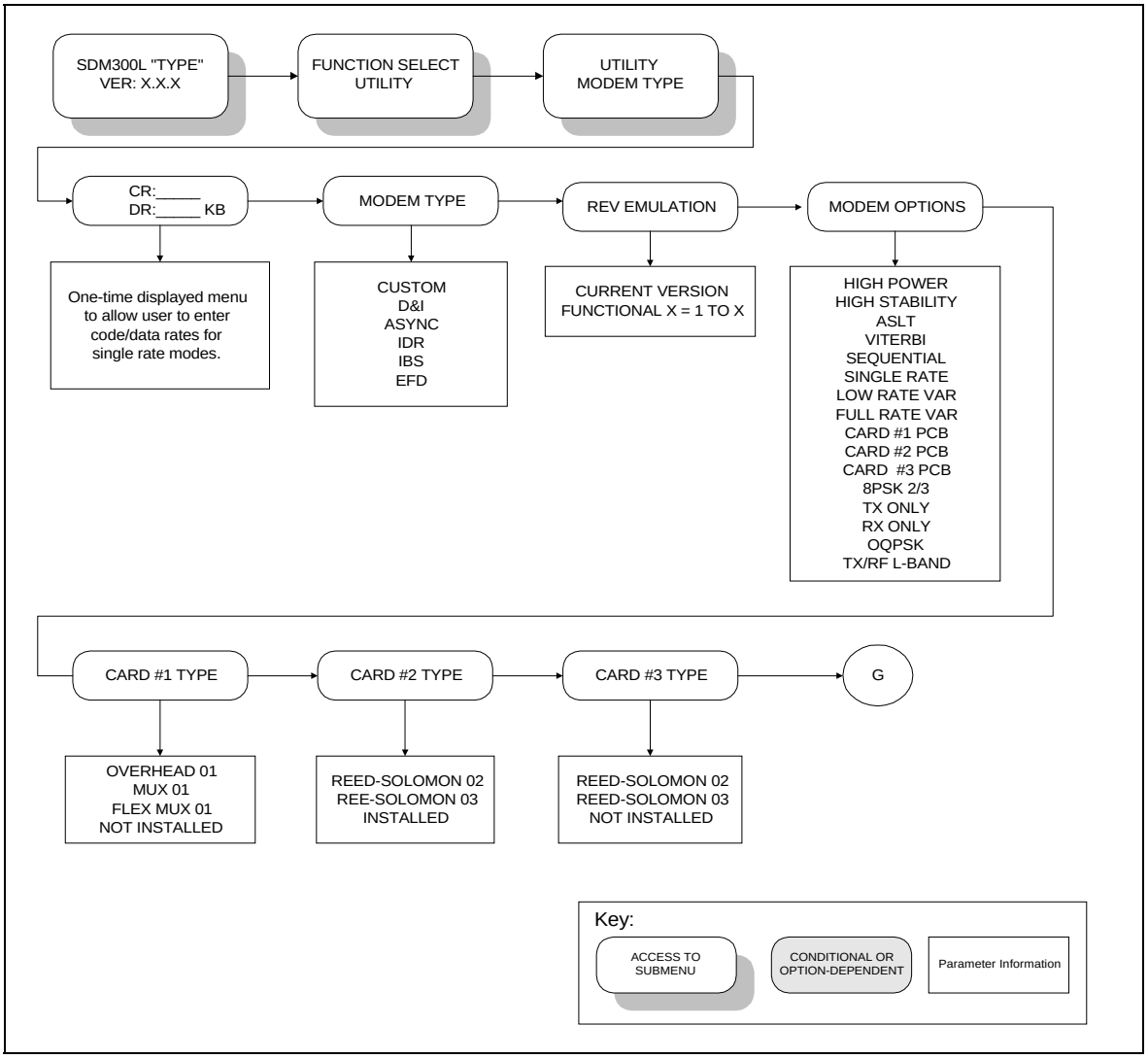


Figure 3-21. Utility Modem Type Menu

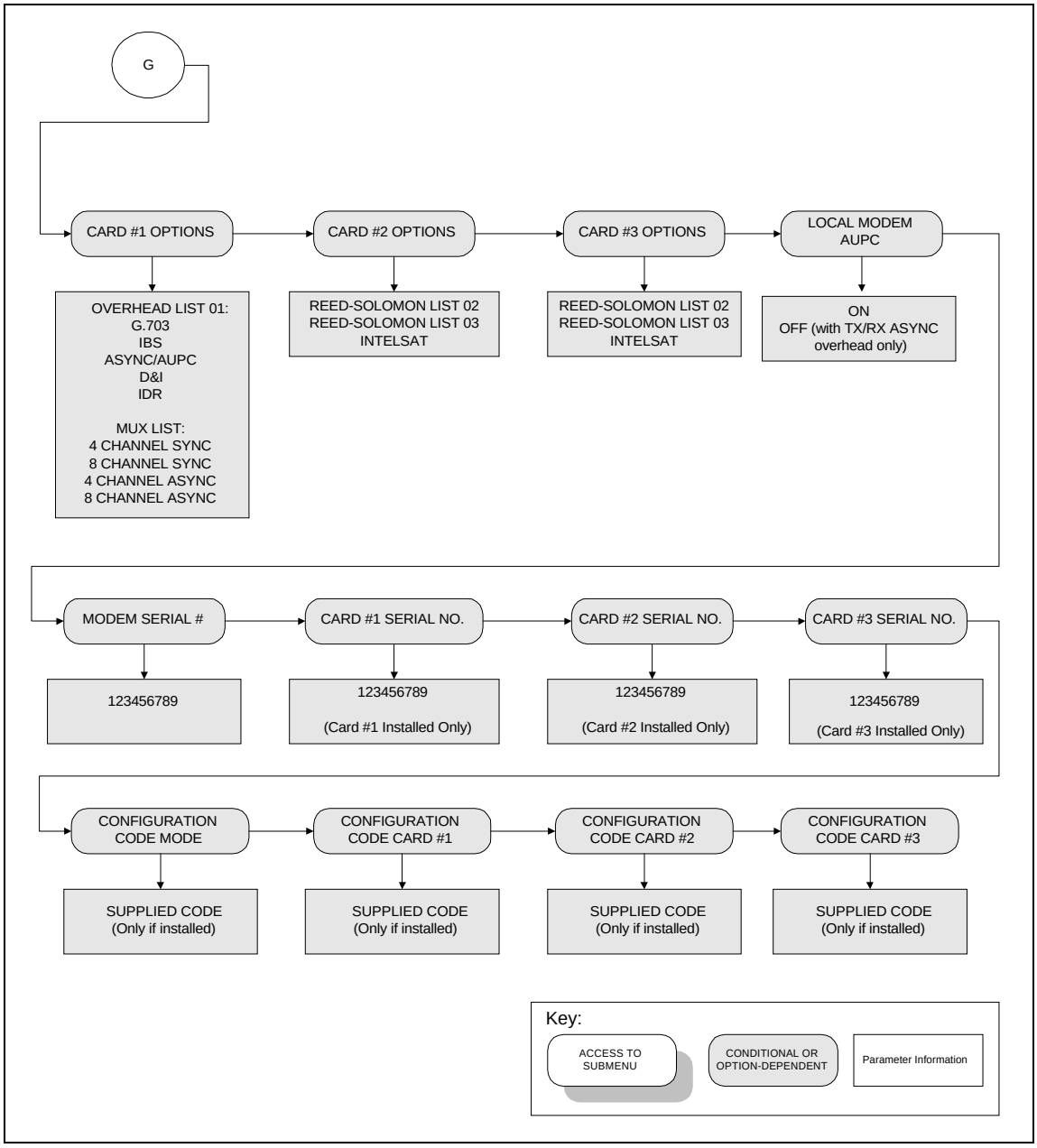


Figure 3-21. Utility Modem Type Menu (Continued)

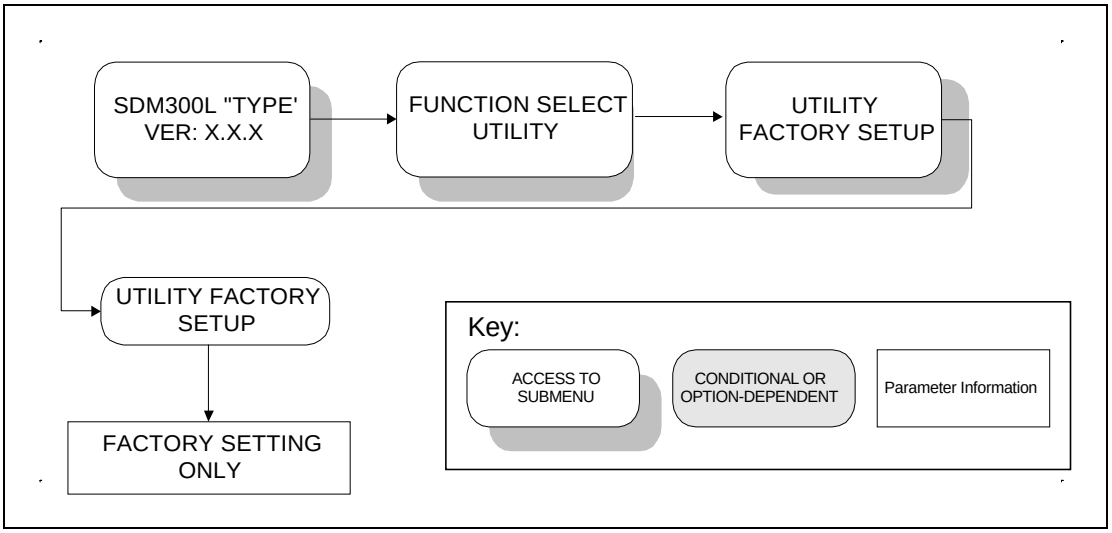


Figure 3-22. Utility Factory Setup Menu

3.3 SDM-300L Custom Modem Defaults

Refer to Table 3-2 for custom modem defaults.

Note: The following parameter do not revert to default settings after a hard reset:

- Address/Parity/Baud Rate
- Remote Type
- EXT AGC MIN Power
- EXT AGC Max Power
- Display Contrast

Table 3-2. SDM-300L Custom Modem Defaults

Modulator		Demodulator	
Data Rate	A	Date Rate	A
TX Rate A	64 kbit/s, QPSK 1/2	RX Rate A	64 kbit/s, QPSK 1/2
TX Rate B	128 kbit/s, QPSK 1/2	RX Rate B	128 kbit/s, QPSK 1/2
TX Rate C	256 kbit/s, QPSK 1/2	RX Rate C	256 kbit/s, QPSK 1/2
TX Rate D	512 kbit/s, QPSK 1/2	RX Rate D	512 kbit/s, QPSK 1/2
TX Rate V	38.4 kbit/s, QPSK 1/2	RX Rate V	38.4 kbit/s, QPSK 1/2
IF Frequency (Non TX/RX)	70 MHz	IF Frequency	1200 MHz
IF Frequency (TX/RX)	1200 MHz	RX Terminal Frequency	4200 MHz
TX Terminal Frequency	5845 MHz	Descrambler	On
IF Output	Off	Differential Encoder	On
Power Level (Non TX/RX)	-10 dBm	IF Loop Back	Off
Power Level (TX/RX)	-10 dBm	BER Threshold	None
Scrambler	On	Sweep Center	0 Hz
Differential Encoder	On	Sweep Range	60000 Hz
Carrier Mode	Normal-Modulated	Reacquisition	0 seconds
Modem Reference	Internal	LNB Power	Off
ODU Power	Off	LNB Voltage	13 VDC
ODU 10 MHz REF	OFF	LNB 10 MHz REF	Off
RS Encoder	Off	RS Decoder	Off
Interface			
TX Clock Source	TX Terrestrial	RX Coding Format	AMI
TX Clock Phase	Auto	Channel, Level (TX/RX)	-5 dBm
EXT-CLK Frequency	1544 kHz	Drop Format	T1
Buffer Clock	RX (Satellite)	Insert Format	T1
Buffer Size	384 bit/s	Drop SAT	Channel Terr, others T-Slot Terr
Buffer Center	Yes/No	Insert SAT	Channel Terr, other T-Slot Terr
RX Clock Phase	Normal	ASYNC TX Baud	110 kbit/s
B-Band Loopback	Off	ASYNC RX Baud	110 kbit/s
Interface Loopback	Off	ASYNC TX Length	7 bit/s
Loop Timing	Off	ASYNC RX Length	7 bit/s
TX Data Fault	None	ASYNC TX Stop	2 bits
RX Data Fault	None	ASYNC RX Stop	2 bits
TX 2047 Pattern	Off	ASYNC TX Parity	Even
RX 2047 Pattern	Off	ASYNC RX Parity	Even
TX Coding Format	AMI		
Configuration Local AUPC			
AUPC Enabled	Off	Target E_b/N_0	6.0 dB
Nominal Power	-10.0 dB	Tracking Rate	0.5 dB/min
Minimum Power	-30.0 dBm	Local CL Action	Hold
Maximum Power	-5.0 dBm	Remote CL Action	Hold

Table 3-2. SDM-300L Custom Modem Defaults (Continued)

Configuration Mux			
Tributary Frequency #1	2048 kbit/s	Tributary #1 to #7	SYNC
Tributary Frequency #2 to #7	256 kbit/s	Tributary #8	ASYNC
Tributary Interface #1 and #8	RS422	Tributary Clock Data	CLK:NRM Data NRM
Tributary Interface #2 to #7	RS232	Aggregate DR	2305 kbit/s
Configuration Flex Mux			
TX Chan # 1 Mode	D&I Enabled	RX Chan # 1 Mode	D&I Enabled
TX Chan # 1 DR	64.0 kbit/s	RX Chan # 1 DR	64.0 kbit/s
TX Chan # 2 Mode	ADPCM Disabled	RX Chan # 2 Mode	ADPCM Disabled
TX Chan # 3 Mode	SYNC RS232	RX Chan # 3 Mode	SYNC RS232
TX Chan # 3 DR	64.0 kbit/s	RX Chan # 3 DR	64.0 kbit/s
TX Chan # 3 Phase	CLK: NRM DATA: NRM	RX Chan # 3 Phase	CLK: NRM DATA: NRM
TX Chan # 4 Mode	ASYNC RS485	RX Chan # 4 Mode	ASYNC RS485
TX Chan # 4 DR	9.6 kbit/s	RX Chan # 4 DR	9.6 kbit/s
TX Chan # 4 Phase	CLK: NRM DATA: NRM	RX Chan # 4 Phase	CLK: NRM DATA: NRM
Function Select Monitor			
RAW BER	2.4 E-3	Buffer Fill	50%
Corrected BER	4.0 E-3	Frame Errors	n.n E-e
E_b/N_0	16.0 dB	LNB Current	0 mA
Receive Signal	-45 dB	ODU Current	0 mA
Sweep Frequency	0 Hz		
Function Select Remote AUPC			
AUPC Enable	Off	TX 2047 Pattern	Off
B-Band Loopback	Off	2047 Errors	n.n E-e
Utility			
Modulator		**Demodulator**	
Data Rate	A	Date Rate	A
TX Rate A	64 kbit/s, QPSK 1/2	RX Rate A	64 kbit/s, QPSK 1/2
TX Rate B	128 kbit/s, QPSK 1/2	RX Rate B	128 kbit/s, QPSK 1/2
TX Rate C	256 kbit/s, QPSK 1/2	RX Rate C	256 kbit/s, QPSK 1/2
TX Rate D	512 kbit/s, QPSK 1/2	RX Rate D	512 kbit/s, QPSK 1/2
TX Rate V	38.4 kbit/s, QPSK 1/2	RX Rate V	38.4 kbit/s, QPSK 1/2
TX Terminal LO	LO Freq of BUC	RX Terminal LO	LO Freq of BUC
MOD Power Offset	0 dB	Demodulator Type	INTERNAL Open
Modulator Type	INTELSAT Open	Decoder Type	Viterbi
Encoder Type	Viterbi	RX BPSK Ordering	Standard
TX BPSK Ordering	Standard	DEMOD Spectrum	Normal
MOD Spectrum	Normal	RX-RS Interleave	8 deep
TX-RS Interleave	8 deep	RX-IESS-310 Mode	Off
TX-IESS-310 Mode	Off	LNB Alarm – Low	0 mA
ODU Alarm – Low	0 mA	LNB Alarm – High	500 mA
ODU Alarm – High	2000 mA	RX Symbol Rate	64 ksps
TX Symbol Rate	64 Ksps		
Utility Interface			
TX Overhead Type	None	Backward Alarm RX #4	On
RX Overhead Type	None	Backward Alarm RX #3	On
TX Terr Interface	RS422	Backward Alarm RX #2	On
RX Terr Interface	RS422	Backward Alarm RX #1	On
Buffer Program	Bits	Backward Alarm TX #4	On
Framing Structure	T1 Framing Structure: G.704 E1 Framing Structure: G.704	Backward Alarm TX #3	On
RTS TX-IF CNTRL	Off	Backward Alarm TX #2	On
TX Data Phase	Normal	Backward Alarm TX #1	On
RX Data Phase	Normal	ASYNC TX Type	RS232
E1 Insert CRC	On	ASYNC RX Type	RS232
		IDR TX ESC Type	2-32k Audio
		IDR RX ESC Type	2-32k Audio
		CTS Delay	0 seconds

Table 3-2. SDM-300L Custom Modem Defaults (Continued)

Utility System			
Time	12:00:00 AM	Self Test	Off
Date	7/04/76	M&C Firmware	FW/NNNNNN-DDR MM/DD/YYYY
Remote Baud Rate	9600 bit/s	Boot Firmware	FW/NNNNNN-DDR MM/DD/YYYY Version:
Remote Address	1	FPGA Firmware	MM/DD/YYYY
Remote Type	RS485 (2-Wire)	Display Contrast	64
Operational Mode	Duplex	EXT AGC: Min Pwr	0 volts
Year Display	2-Digit	EXT AGC: Max Pwr	10 volts
Utility Modem Type			
Modem Type	Custom	Card #2	Reed-Solomon 02
Rev Emulation	Current	Card #3	Reed-Solomon 03
Card #1	Overhead 01	Local Modem AUPC	Off

3.4 Custom Operation

Note: If the modem serves as the backup unit for a rack of modems having different hardware and FAST options, then the backup modem shall have all of the features and hardware found in the other modems.

Operating in Custom mode allows access to all front panels menus, including the Utility menus. The Custom operation mode is mainly used when the modem must function with no overhead in an open network application. For example, to use the modem in the IDR mode of operation with overhead (IESS308-2), the following steps are taken:

1. Select the IDR modem type, so that the modem loads the IDR default parameter.

2. Select the Custom modem type, which allows Access to the modulator and demodulator overhead type.

3. Select NONE for the overhead types.

A protection switch can make use of the Custom operation mode when the modem is configured as a backup modem. Because the backup modem is operating in Custom Mode, the switch can program all the backup modem parameters. Thus, the one backup modem can be made compatible with all of the various application types found in the rack.

Appendix A. OPTIONS

This appendix describes the options available for the SDM-300L.

A.1 FAST Accessible Options

Comtech EFData's FAST system allows immediate implementation of different options through the user interface keypad. Some FAST options are available through the basic platform unit, while others require that the unit be equipped with optional hardware or that the hardware be installed in the field. Refer to Table A-1 for a listing of possible configurations.

The options available through the FAST architecture include:

- ASYNC/AUPC
- Viterbi Decoder
- Sequential Decoder
- Asymmetrical loop timing
- G.703 operation
- Variable data rates

Table A-1. FAST Options and Required Configurations

Hardware	Single Data Rate	Low Variable Data Rate (up to 512 M/bits)	High Variable Data Rate (up to 4..375 M/bits)	Viterbi Decoder	Sequential Decoder	Asyemmetrical Loop Timing	OQPSK	G.703	ASYNC/AUPC Overhead	Reed-Solomon Codec
Basic Platform 300L	X			X (Note)	X (Note)					
FAST Options		X	X	X	X	X	X			
FAST Options with Overhead Hardware								X	X	
FAST Options with Reed-Solomon Hardware										X

Note:
The basic modem is shipped with either Sequential or Viterbi decoder. Optional: A unit can be shipped with both Viterbi and Sequential decoders.

A.1.1 FAST System Theory

FAST is an enhancement feature available only in Comtech EFData products, enabling on-location upgrade of the operating feature set—in the rack—without removing a modem from the setup. When service requirements change, the operator can upgrade the topology of the modem to meet those requirements within minutes after confirmation by Comtech EFData. This accelerated upgrade can be accomplished only because of FAST's extensive use of programmable devices incorporating Comtech EFData-proprietary signal processing techniques. These techniques allow the use of a unique access code to enable configuration of the available hardware. The access code can be purchased at any time from Comtech EFData. Once obtained, the access code is loaded into the unit through the front panel keyboard or the rear remote port.

With the exclusive FAST technology, operators have maximum flexibility for enabling functions as they are required. FAST allows an operator to order a modem precisely tailored for the initial application, reducing risk and cost overruns during the application integration process.

A.1.2 Implementation

FAST is factory-implemented in the modem at the time of order. Hardware options for basic modems can be ordered and installed either at the factory or in the field. The operator can select options that can be activated easily in the field, depending on the current hardware configuration of the modem.

A.1.2.1 Activation Procedure

1. Obtain Modem serial number as follows:

   a. Press [CLEAR] to return to the Main menu.

   b. Use [←] and [→] to select Function Select menu.

   c. Press [ENTER].

   d. Use [←] and [→] to select Utility Modem Type menu.

   e. Press [ENTER].

   f. Use [←] and [→] to select Modem Serial # menu.

   g. Record serial number: _____

2. Select desired features as follows:

   a. Use [←] and [→] to select Modem Options menu.

   b. Press [ENTER].

   c. Scroll through the Modem Options and check off all features that display a "+" sign as follows:

HIGH POWER	[ ]	FULL RATE VAR	[ ]
HIGH STABILITY	[ ]	CARD #1 PCB	[ ]
ASLT	[ ]	CARD #2 PCB	[ ]
VITERBI	[ ]	CARD #3 PCB	[ ]
SEQUENTIAL	[ ]	8PSK 2/3	[ ]
SINGLE RATE	[ ]	RX Only	[ ]
LOW RATE VAR	[ ]	OQPSK	[ ]

Notes:

1. If the menu displays a "0", the unit will need to be returned to the manufacturer for the desired hardware upgrade.
2. If the unit displays an "X," the unit can be upgraded in the field.
3. If the unit displays a "+", the feature is installed.
4. If the unit displays a "-," the feature is FAST accessible.

d. Press [CLEAR].

e. Use [←] and [→] to select CARD #1 (Overhead Card) menu.

f. Record Card #1 serial number, if displayed:_____

g. Use [←] and [→] select CARD #2 (Reed-Solomon Card) menu.

h. Record Card #2 serial number, if displayed:_____

i. Press [CLEAR].

3. Contact an Comtech EFData sales representative to order features.

4. Comtech EFData Customer Support personnel will verify the order and provide an invoice and instructions.

5. Enter access codes as follows:

a. Press [CLEAR] to return to the Main menu.

b. Use [←] and [→] to select Function Select Utility menu.

c. Press [ENTER].

d. Use [←] and [→] to select Utility Modem Type menu.

e. Press [ENTER].

f. Use [←] and [→] to select Configuration Code Modem menu.

g. Press [ENTER].

h. Menu appears as follows:

AAAAAAAAAA
AAAAAAAAAA

i. Enter the access code.

Use the following example for practice:

Use [↑][↓] to input: 5CBB397F4D
Press [→].
Use [↑][↓] to input: 773B285AA5
Press [ENTER].
Display exhibit “WRONG CODE ENTERED”.

6. If properly re-initialized, the display exhibits “REINITIALIZED” and reset.
7. Check upgrade as follows:
   a. Press [CLEAR] to return to the Main menu.
   b. Use [←] and [→] to select Function Select Utility menu.
   c. Press [ENTER].
   d. Use [←] and [→] to select Utility Modem Type menu.
   e. Press [ENTER].
   f. Use [←] and [→] to select Modem Options menu.
   g. Press [ENTER].
   h. Use [←] and [→] to scroll through features. Visually check selected features for a “+” sign. If a “+” sign is evident, the upgrade is completed.
8. If upgrade is incorrect, the menu display will exhibit “WRONG CODE ENTERED.” Repeat procedures. Contact Comtech EFData Customer Support personnel for further instructions, if the error message remains.

A.2 Options

A summary of the options available for the unit is provided in Table A-2. Contact Comtech EFData Customer Support for the availabilty status of the the desired option(s).

Table A-2. Options Summary

Option	Description & Comments	SDM-300L1	SDM-300L2	Install Option
Single Data/Code Rate		Yes	Yes	FAST
Low Rate Variable	≤ 512 Kbit/s	Yes	Yes	FAST
Full Rate Variable	QPSK maximum is 4.375 maximum	Yes	Yes	FAST
OQPSK		Yes	Yes	FAST
TX = 70 / 140 MHz, RX = L-Band		Yes	Not Available	Factory
TX = L-Band, RX = L-Band		Not Available	Yes	Factory
RX Only, L-Band		Not Available	Yes	Factory
TX = 50Ω IF Impedance		Yes	Standard	Factory
TX = 75Ω IF Impedance		Standard	Not Available	Factory
Sequential or Viterbi Codec	Modem can be supplied with either: Viterbi, Sequential or both	Yes	Yes	FAST
TX Reed-Solomon Codec	Concatenates with Viterbi or Sequential	Yes	Yes	User
RX Reed-Solomon Codec	Concatenates with Viterbi or Sequential	Yes	Yes	User
Asymmetrical Loop Timing (SCT)		Yes	Yes	FAST
Asynchronous (Async/AUPC) Interface with 50 pin D Connector	Requires Overhead Card. Includes automatic uplink power control (AUPC)	Yes	Yes	User
High Stability Reference. Internal stability = ± 0.02 PPM, with the ability to drive out the external reference connector		Yes (Optional)	Standard	Factory
G.703 Interface. Note, For BNC or 15 pin D interface see UB-530 breakout panels.	Requires Overhead Card with 50 pin D Connector	Yes	Yes	User
37-Pin Female D Connector	EIA-422/EIA-449 Interface and Mil-188-114	Yes	Yes	User
25-Pin Female D Connector	EIA-530 (RS-422), EIA-232 and V.35	Yes	Yes	User
34-Pin Female V.35	"Winchester" Connector with V.35	Yes	Yes	User
50-Pin Female D Connector for use Without Overhead card.	Inlcudes EIA-422, EIA-232, and V.35 Use with redundancy switches	Yes	Yes	User
Primary Power: Auto-ranging AC 85 to 264 VAC		Yes	Yes	Factory
Future Or Not Available				
-30 to -5 dBm IF output (low power)	Output 2nd Harmonics: < 45 dBc at data rates < 64 kbit/s < 50 dBc at data rates ≥ 64 kbit/s	Not Available	Not Available	Factory
8PSK, 2/3 rate, IESS-310	Requires Viterbi and Reed-Solomon Codec	Not Available	Not Available	User
8PSK, 2/3 rate, EFD Mode	Requires Viterbi Codec	Not Available	Not Available	User
IBS and IDR Interface	Requires Overhead Card	Not Available	Not Available	User
Drop & Insert Interface	Requires Overhead Card	Not Available	Not Available	User
Flex Mux		Not Available	Not Available	User
Mux	Available in: 4-Channel 8-Channel	Not Available	Not Available	User
Primary Power: 48 VDC		Yes (Future)	Yes (Future)	Factory
ODU DC Power: 15V, 24V, 28V or 48V. Primary input = AC Only	3 Amps maximum or less depending upon power supply.	Not Available	Yes (Future)	Factory

METRIC CONVERSIONS

Units of Length

Unit	Centimeter	Inch	Foot	Yard	Mile	Meter	Kilometer	Millimeter
1 centimeter	—	0.3937	0.03281	0.01094	6.214×10^{-6}	0.01	—	—
1 inch	2.540	—	0.08333	0.2778	1.578×10^{-5}	0.254	—	25.4
1 foot	30.480	12.0	—	0.3333	1.893×10^{-4}	0.3048	—	—
1 yard	91.44	36.0	3.0	—	5.679×10^{-4}	0.9144	—	—
1 meter	100.0	39.37	3.281	1.094	6.214×10^{-4}	—	—	—
1 mile	1.609×10^{5}	6.336×10^{4}	5.280×10^{3}	1.760×10^{3}	—	1.609×10^{3}	1.609	—
1 mm	—	0.03937	—	—	—	—	—	—
1 kilometer	—	—	—	—	0.621	—	—	—

Temperature Conversions

Unit	° Fahrenheit	° Centigrade
32° Fahrenheit	—	0 (water freezes)
212° Fahrenheit	—	100 (water boils)
-459.6° Fahrenheit	—	273.1 (absolute 0)

Formulas
C = (F - 32) * 0.555
F = (C * 1.8) + 32

Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoir.	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoir.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoir.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	1.0×10^{3}	35.27	32.15	2.205	2.679	—

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